

PAID \$ 6.00

219401

State of Colorado)
County of San Miguel)

Filed for record: December 22, 1980, Time:
10:00 A.M. and duly recorded in Book 390 -
Pages 587-589. Gay Cappa-Recorder
by *Katherine G. Gay* Deputy

QUITCLAIM

THIS QUITCLAIM made this 13th day of

November, 1980, by and between

MINERALS EXPLORATION COMPANY, a California corporation, whose address is P. O. Box 54945, Los Angeles, California 90054, hereinafter referred to as "First Party";

and

FIRET RESOURCES, INC., a corporation whose address is 5325 S. Valentia Way, Englewood, Colorado 80111, hereinafter referred to as "Second Party";

State Documentary Fee
Date DECEMBER 22, 1980
\$ EMPTY kr

WITNESSETH:

In consideration of the sum of TEN DOLLARS (\$10.00)

paid to First Party and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, First Party does hereby remise, release and quitclaim unto Second Party, its successors and assigns forever, all the right, title, interest, claim and demand which the First Party has in, to and under the following described water rights, or any interest therein, in San Miguel County, Colorado, to wit:

District Priority Number	Name	Volume
188	Silver Bell Plume & Pipeline No. 1	3.03 CFS
207	Silver Bell Lower Cross Cut Tunnel	7.84 CFS
174	Silver Bell Plume & Pipeline No. 3	8.50 CFS

All referred to as the "Rights" in this claim.

Further consideration for this Quitclaim is Second Party's acceptance of the Rights on an as is basis and without warranty, either expressed or implied, of title, fitness for purpose, merchantability or any other similar or dissimilar condition or covenant and subject to all obligations and duties

U 011205

BOOK 390 PAGE 588

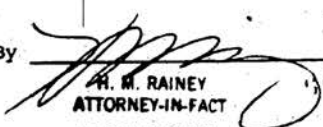
burdening the Rights to the extent required by law.

TO HAVE AND TO HOLD to the proper use and benefit of
the Second Party, its successors and assigns forever.

IN WITNESS WHEREOF the First Party hereto caused this
Quitclaim to be executed the day and year first above written.

MINERALS EXPLORATION COMPANY

By


H. M. RAINEY
ATTORNEY-IN-FACT
FIRST PARTY

STATE OF _____)
) ss.
COUNTY OF _____)

The foregoing instrument was acknowledged before
me this _____ day of _____, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Molycorp, Inc.

Witness my hand and official seal.

Notary Public

My Commission Expires: _____

STATE OF Colorado)
) ss.
COUNTY OF Adams)

The foregoing instrument was acknowledged before
me this 13th day of November, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Minerals
Exploration Company.

Witness my hand and official seal.



George F. Deak
Notary Public

My Commission Expires: 1-25-84

U 011207

P-
Please send a copy
of the Q/C's to
JOL & Rltt. The
orig can go into the
opht file under title
T.

U 011208

219406
County of San Diego
Filed for Record December 21, 1980.
Time: 10:30 A.M. and duly recorded in
Book 390 Page 403-404.
By County Recorder
by *[Signature]* Deputy

BILL OF SALE

KNOW ALL MEN BY THESE PRESENTS:

THAT MINERALS EXPLORATION COMPANY, a California corporation, does by these presents, for a valuable consideration, sell, assign and set over to Fleet Resources, Inc., 5325 S. Valentia Way, Englewood, Colorado 80111, those certain buildings and that certain shop equipment, mill machinery, assay office, mine equipment and office equipment listed on the Property Appraisal Record attached hereto and by this reference made a part hereof.

Minerals Exploration Company makes no warranty or representation, either expressed or implied, as to title, fitness for purpose, merchantability or any similar or dissimilar condition or covenant respecting said buildings, shop equipment, mill machinery, assay office, mine equipment and office equipment.

If any sales tax or other tax is or becomes due by reason of this transaction same shall be paid by Fleet Resources, Inc.

IN WITNESS WHEREOF, Minerals Exploration Company has executed this Bill of Sale this 13th day of November, 1980.

Minerals Exploration Company

By *[Signature]*
H. M. RAINEY
ATTORNEY-IN-FACT *HRB*

U 011209

STATE OF _____)
COUNTY OF _____) ss.

The foregoing instrument was acknowledged before
me this _____ day of _____, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Molycorp, Inc.

Witness my hand and official seal.

Notary Public

My Commission Expires: _____

STATE OF Colorado)
COUNTY OF Adams) ss.

The foregoing instrument was acknowledged before
me this 13th day of November, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Minerals
Exploration Company.

Witness my hand and official seal.



[Signature]
Notary Public

My Commission Expires: 1-25-84

U 011210

1.00

219405

State of Colorado)
County of San Miguel) ss

Filed for record: December 22, 1980.
Time: 10:40 A.M. and duly recorded in

Book 390 Pages 600 - 604

Gay Campis-Recorder

by *Kathleen G. Smith* Deputy

QUITCLAIM

THIS QUITCLAIM made this 13th day of

November, 1980, by and between

MINERALS EXPLORATION COMPANY, a California corporation, whose address is P. O. Box 54945, Los Angeles, California 90054, hereinafter referred to as "First Party"

and

FLEET RESOURCES, INC., a corporation whose address is 5325 S. Valentia Way, Englewood, Colorado 80111, hereinafter referred to as "Second Party";

State Document Fee

Date DECEMBER 22, 1980

EXPT KI

WITNESSETH:

In consideration of the sum of TEN DOLLARS (\$10.00)

paid to First Party and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, First Party does hereby remise, release and quitclaim unto Second Party, its successors and assigns forever, all the right, title, interest, claim and demand of First Party which it may own or hereafter acquire in, to and under certain unpatented lode and placer mining claims and properties located in San Miguel County, Colorado, as more particularly described in Exhibit "A" attached hereto and by this reference made a part hereof.

TO HAVE AND TO HOLD unto Second Party and its successors and assigns forever all of the above mining claims, properties and interest (all referred to as the "Claims" in this Quitclaim), together with any and all mines, veins, lodes and mineral deposits now owned or hereafter acquired by First Party, its successors and assigns, extending from or into or contained in the lands on which said Claims are located; all right, title and interest of First Party in and to the surface and subsurface of said lands and all water, water rights, easements or rights of way now or hereafter

U 011211

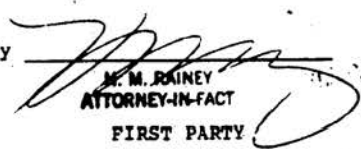
owned or held by First Party, its successors and assigns, in, upon, or under said lands or pertaining thereto and all tenements, hereditaments and appurtenances thereof including, but not limited to, that certain mill and crushing plants and those certain auxiliary facilities and miscellaneous equipment collectively known as the Ophir Mill, which mill is located near the town of Ophir, San Miguel County, Colorado.

Further consideration for this Quitclaim is Second Party's acceptance of the Claims on an as is basis and without warranty, either expressed or implied, as to title, fitness of purpose, merchantability or any similar or dissimilar condition or covenant and subject to all obligations and duties burdening the Claims including, but not limited to, abandonment or restoration to the extent required by law.

IN WITNESS WHEREOF the First Party hereto has caused this Quitclaim to be executed the day and year first above written.

MINERALS EXPLORATION COMPANY

By


M. M. RAINEY
ATTORNEY-IN-FACT
FIRST PARTY

STATE OF _____)
COUNTY OF _____) ss.

The foregoing instrument was acknowledged before
me this _____ day of _____, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of MolyCorp, Inc.

Witness my hand and official seal.

Notary Public

My Commission Expires: _____

STATE OF COLORADO)
COUNTY OF ADAMS) ss.

The foregoing instrument was acknowledged before
me this 13th day of NOVEMBER, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Minerals
Exploration Company.

Witness my hand and official seal.



Henry P. O'Neil
Notary Public

My Commission Expires: JAN. 25, 1984

U 011213

Exhibit "A" to Quitclaim Deed Dated the
3rd day of NOVEMBER, 1980, Between
 Minerals Exploration Company, Grantor, and
 Fleet Resources, Inc., Grantee

UNPATENTED LODE AND PLACER MINING CLAIMS AND MILLSITES
 SAN MIGUEL COUNTY, COLORADO

LOCATION CERTIFICATE
 RECORDED IN SAN MIGUEL
 COUNTY, COLORADO

CLAIM NAME	DATE OF LOCATION	RECORDS AT		SERIAL NUMBER
		BOOK	PAGE	
Badger Boy Lode	10-14-1902	79	482	C MC 130726
Amended	09-21-1917	122	105	
Columbine	07-19-1922	119	401	C MC 130727
Amended	03-16-1925	122	191	
Dayton	07-27-1932	119	565	C MC 130728
Dayton No. 2	07-28-1932	119	566	C MC 130729
Dewey	07-19-1898	73	428	C MC 130730
Amended	09-21-1917	122	107	
Dewey No. 3, Lode	09-15-1901	79	372	C MC 130731
Amended	10-10-1917	116	320	
Gold King	06-24-1921	119	369	C MC 130732
Amended	10-04-1932	122	248	
Gold Queen	07-19-1922	119	400	C MC 130733
Amended	03-16-1925	122	189	
Golden Crown Extension	07-19-1922	119	401	C MC 130734
Amended	03-16-1925	122	190	
Key	03-31-1925	119	440	C MC 130735
Suffolk Extension	07-19-1922	119	400	C MC 130736
Amended	03-16-1925	122	188	
Calmet	06-03-1900	79	173	C MC 130737
Amended	10-22-1903	64	291	
Cascade	05-31-1905	96	101	C MC 130738
Farwell	07-09-1898	73	433	C MC 130739
Great View	07-09-1898	73	434	C MC 130740
Mohawk No. 1	07-09-1898	73	434	C MC 130741
Amended	06-30-1924	122	187	
Portland	09-20-1899	79	68	C MC 130742
Amended	07-07-1924	122	183	
Vindicator	01-01-1901	79	245	C MC 130743
Amended	07-07-1924	122	184	
Vindicator No. 1	01-01-1901	79	246	C MC 130744
Amended	07-07-1924	122	185	
Vista	05-31-1905	96	100	C MC 130745
Amended	06-30-1924	122	186	
Tip Top No. 5	08-09-1910	96	391	C MC 130746
Amended	08-25-1913	64	455	
Tip Top No. 6	08-12-1925	119	457	C MC 130747
Tip Top No. 9	08-12-1925	119	457	C MC 130748
Aurum	07-20-1953	225	666	C MC 130749
Carbonero Mill Site	06-09-1951	216	65	C MC 130750
Connection	09-19-1955	261	415	C MC 130751
Dayton No. 6	06-25-1951	175	91	C MC 130752
Dayton No. 7	06-25-1951	175	92	C MC 130753
J. G.	09-26-1951	216	112	C MC 130754
Panama Mill Site	06-09-1951	216	64	C MC 130755
Plumbum	10-07-1952	175	188	C MC 130756
Sanders Tunnel Claim	06-19-1951	216	65	C MC 130757
Silver Bell No. 101	03-06-1974	348	152 & 159	C MC 130758
Silver Bell No. 102	03-06-1974	348	153 & 159	C MC 130759
Silver Bell No. 103	03-06-1974	348	154 & 159	C MC 130760
Silver Bell No. 104	03-06-1974	348	155 & 159	C MC 130761
Silver Bell No. 105	03-06-1974	348	156 & 159	C MC 130762
Silver Bell No. 106	03-06-1974	348	157 & 159	C MC 130763
Silver Bell No. 107	03-06-1974	348	158 & 159	C MC 130764

U 011214

SEEK 700 PAGE 804

LOCATION CERTIFICATE
RECORDED IN SAN MIGUEL
COUNTY, COLORADO

<u>CLAIM NAME</u>	<u>DATE OF LOCATION</u>	<u>RECORDS AT BOOK</u>	<u>PAGE</u>	<u>SERIAL NUMBER</u>
Silver Bell No. 108	06-28-1974	350	528 & 529	C MC 130765
Amended	10-22-1974	350	803	
Silver Bell No. 109	06-28-1974	350	530 & 531	C MC 130766
Amended	10-22-1974	350	804	
Silver Bell No. 110	06-28-1974	350	532 & 533	C MC 130767
Amended	10-22-1974	350	805	
Silver Bell No. 111	06-28-1974	350	534 & 535	C MC 130768
Amended	12-09-1976	362	460	
Silver Bell No. 112	06-28-1974	350	536 & 537	C MC 130769
Amended	10-22-1974	350	807	
Silver Bell No. 113	06-28-1974	350	538 & 539	C MC 130770
Amended	10-22-1974	350	808	
Ophir 17	09-01-1946	174	381	C MC 130771
Ophir 27	09-01-1946	174	381	C MC 130772
Spar No. 1	06-07-1940	174	115	C MC 130773
Spar No. 2	07-06-1940	174	115	C MC 130774
Spar No. 3	07-06-1940	174	116	C MC 130775
Spar No. 4	07-06-1940	174	116	C MC 130776
Spar No. 5	07-06-1940	174	117	C MC 130777

PAID \$ 17.25

219403

State of Colorado)
County of San Miguel)

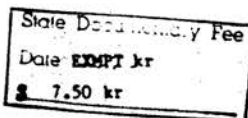
Filed for record: December 22, 1980. Time:
10:20 A.M. and duly recorded in Book 390-
Pages 593-596. Gay Capps-Recorder
by *Matthew G. Guss* Deputy

QUITCLAIM

THIS QUITCLAIM made this 13th day of
November, 1980, by and between

MINERALS EXPLORATION COMPANY, a California
Corporation, whose address is P. O. Box 54945,
Los Angeles, California 90054, hereinafter
referred to as "First Party";

and



FLEET RESOURCES, INC., a corporation whose
address is 5325 S. Valentia Way, Englewood,
Colorado 80111, hereinafter referred to as
"Second Party".

WITNESSETH:

In consideration of the sum of TEN DOLLARS (\$10.00) paid
to First Party and other good and valuable consideration, the receipt
and sufficiency of which is hereby acknowledged, First Party does
hereby remise, release and quitclaim to Second Party, its successors
and assigns forever, all the right, title, interest, claim and
demand of First Party which it may own or hereafter acquire in, to
and under certain patented lode mining claims and properties located
in San Miguel County, Colorado, as more particularly described in
Exhibit "A" attached hereto and by this reference made a part
hereof.

TO HAVE AND TO HOLD UNTO Second Party and its successors
and assigns forever all of the above mining claims, properties and
interest (all referred to as the "Claims" in this Quitclaim),
together with any and all mines, veins, lodes and mineral deposits
now owned or hereafter acquired by First Party, its successors and
assigns, extending from or into or contained in the lands on
which said Claims are located; all right, title and interest of
First Party in and to the surface and subsurface of said lands and

U 011216

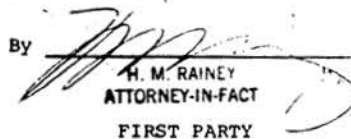
all water, water rights, easements or rights of way now or hereafter owned or held by First Party, its successors and assigns, in, upon or under said lands or pertaining thereto and all tenements, hereditaments and appurtenances thereof.

Further consideration for this Quitclaim is Second Party's acceptance of the Claims on an as is basis and without warranty, either expressed or implied, of title, fitness for purpose, merchantability or any other similar or dissimilar condition or covenant and subject to all obligations and duties burdening the Claims including, but not limited to, abandonment or restoration to the extent required by law.

IN WITNESS WHEREOF the First Party hereto has caused this Quitclaim to be executed the day and year first above written.

MINERALS EXPLORATION COMPANY

By


H. M. RAINEY
ATTORNEY-IN-FACT
FIRST PARTY

STATE OF _____)
COUNTY OF _____) ss.

The foregoing instrument was acknowledged before
me this _____ day of _____, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Molycorp, Inc.

Witness my hand and official seal.

Notary Public

My Commission Expires: _____

STATE OF Colorado)
COUNTY OF ADAMS) ss.

The foregoing instrument was acknowledged before
me this 13th day of November, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Minerals
Exploration Company.

Witness my hand and official seal.



George F. O'Neil
Notary Public

My Commission Expires: 1-25-81

U 011218

Exhibit "A" to Quitclaim Deed, Dated the
13th day of November, 1980,
 Between Minerals Exploration Company, Grantor,
 and Fleet Resources, Inc., Grantee

PATENTED LODE MINING CLAIMS
SAN MIGUEL COUNTY, COLORADO

<u>Claim Name</u>	<u>Mineral Survey Number</u>	<u>Acres (Approximate)</u>
Gold Eagle Lode	2,630)	
Valley View Lode	5,007)	
Yellow Boy Lode	7,270)	
Yellow Girl Lode	7,270)	49.5925
Hidden Treasure Lode	9,029)	
St. Louis Lode (1/4 undivided interest)	7,549)	
Tidal Wave Lode	7,564)	
Bonita Lode	5,978	9.700
Little Eva Lode	5,978	9.700
El Mundo Lode	4,611	3.819
Mon Bijou Lode	4,576	7.690
Single Standard Lode (undivided 15/16)	4,575	9.870
Broadway Lode	5,735	4.020
Montana Lode	6,979	8.610
Rockislander Lode	1,009	7.580
Creve Coeur Lode (Undivided 3/4 Interest)	12,373	
Capitan Lode	1,224	4.750
Carribeau Lode	686	9.970
Celt Lode	18,500)	
Delta Lode	18,500)	
Florence Lode	18,500)	
McCarthy Lode	18,500)	58.057
O.K. Lode	18,500)	
Schenectady Lode	18,500)	
Security Lode	18,500)	
Colorado Lode	1,223	10.330
Montezuma Lode	347A	10.300
Harvest Moom Lode	14,168)	17.250
Mountain Queen Lode	14,168)	
Montezuma Mill Site	347A	5.000
Black Cloud Lode	10,181)	
Black Diamond No. 3 Lode	18,062)	
Black Diamond No. 4 Lode	18,062)	35.185
Prospector Lode	18,062)	
Boston Belle Lode	16,906)	
Carbon Lode	16,906)	
Carbonado Lode	16,906)	36.146
Carbonero Lode	16,906)	
East Panama Lode	19,815)	
West Panama Lode	19,815)	31.865
Full Moon Lode	20,327	17.128
Mohawk Lode	1,436	10.330
North Star Lode	16,905	10.331
North Star Mill Site	20,302	4.995
Attica Lode (Undivided 1/4)	16,654	2.314
		374.532 acres
		(more or less)

U 011219

PAID \$5.00.

219402

State of Colorado
County of San Miguel

Filed for record: December 22, 1980. Time:
10:10 A.M. and duly recorded in Book 390
Pages 590-592. Cey Capps-Recorder
by *Kathleen J. Capps* Deputy

QUITCLAIM DEED

THIS QUITCLAIM DEED made this 13th day of

November, 1980, by and between

MINERALS EXPLORATION COMPANY, a California
corporation, whose address is P. O. Box 54945,
Los Angeles, California 90054, hereinafter
referred to as "First Party"

State Documentary Fee
Date DECEMBER 22, 1980
EXEMPT kr

and

FLEET RESOURCES, INC., a corporation whose
address is 5325 S. Valentia Way, Englewood,
Colorado 80111, hereinafter referred to as
"Second Party";

W I T N E S S E T H:

In consideration of the sum of TEN DOLLARS (\$10.00)
paid to First Party and other good and valuable consideration, the
receipt and sufficiency of which is hereby acknowledged, First
Party does hereby remise, release and quitclaim unto Second Party,
its successors and assigns forever, all the right, title, interest,
claim and demand which the First Party has in, to and under the
following described real property located in the Town of Ophir,
San Miguel County, Colorado, to-wit:

Lots 11 and 12 - Block M - Ophir.

TO HAVE AND TO HOLD to the proper use and benefit of
Second Party, its successors and assigns forever.

Further consideration for this Quitclaim is Second Party's
acceptance of said real property on an as is basis and without
warranty, either expressed or implied, of title, fitness for purpose,
merchantability or any other similar or dissimilar condition or
covenant and subject to all obligations and duties burdening said

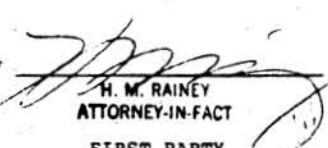
U 011220

real property to the extent required by law.

IN WITNESS WHEREOF First Party hereto has caused this
Quitclaim Deed to be executed the day and year first above written.

MINERALS EXPLORATION COMPANY

By


H. M. RAINEY
ATTORNEY-IN-FACT
FIRST PARTY

STATE OF _____)
COUNTY OF _____) ss.

The foregoing instrument was acknowledged before
me this _____ day of _____, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Molycorp, Inc.

Witness my hand and official seal.

Notary Public

My Commission Expires: _____

STATE OF COLORADO)
COUNTY OF ADAMS) ss.

The foregoing instrument was acknowledged before
me this 15th day of November, 1980 by
H. M. RAINEY, as attorney-in-fact on behalf of Minerals
Exploration Company.

Witness my hand and official seal.



George F. Gies
Notary Public

My Commission Expires: 1-25-81

U 011222

Molycorp, Inc.

union
MOLYCORP

January 28, 1983

FAX TO:

J. I. Mosteller
Tax Dept. Room 5-208
Ext. 6161

FROM:

Cover + 1 page

Sonja Scott *Sonja*
Molycorp, Denver

Joe:

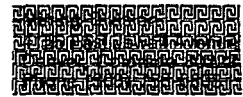
Our files do not have a copy of an executed assignment or quitclaim, only correspondence indicating that the transfer was made.

Attached is a letter acknowledging such.

If that is not sufficient, perhaps a check with the county recorder could produce a recorded quitclaim.

Baumgartner

Mining Division
5670 South Syracuse Circle
Plaza West • Suite 418
Englewood, Colorado 80111
Phone (303) 779-5500



H.
DEC 6 1979

30 November 1979

Molycorp, Inc.
Union Oil Center
P.O. Box 54945
Los Angeles, CA 90054

ATTN: H. M. Rainey
Manager of Lands

Dear Mr. Rainey:

The Ophir and Ruth Claims have been returned to us and we acknowledge.

According to your office, the assessment affidavits have been filed with the County Clerk and the BLM. Also, I understand that the claims were filed with the BLM according to recent requirements. The BLM will probably send notice to you along with the assigned list of CMC numbers. We would appreciate a copy of said notice and list when you receive same.

Many Thanks,

BAUMGARTNER COMPANIES

Adrian W. Vander Pyl
Adrian W. Vander Pyl

AWV/jr

U 011224



**SILVER
BELL** Industries, Inc.
(Formerly SILVER BELL MINES CO.)

PHONE (303) 333-4211-12

158 FILLMORE ST., DENVER, COLORADO 80206

BASE METAL MINING PROPERTY, OPHIR, COLORADO • URANIUM & VANADIUM, OTHER AREAS

H. M. RAINEY

February 13, 1979

FEB 16 1979
FEB 16 1979

Mr. W. H. Garza
Manager Administrative Services
Minerals Exploration Company
P. O. Box 54945
Los Angeles, CA 90054

Re: Silver Bell Acquisition
December 5, 1978

Dear Walt:

In reply to your letter of February 7, 1979, we agree with the contents of your letter regarding your interpretation of the taxes and the Belisle and Pollman-Frank Baumgartner contract. Our check No. 2890 in the amount of \$4,062.17 is enclosed. This, I believe, should clear up all the odds and ends at least to date.

With kindest regards,

Yours very truly,

SILVER BELL INDUSTRIES, INC.

Eugene H. Sanders
President

EHS/c
Encl.

cc: Mr. E. H. Eakland, Jr.
Mr. J. R. McKeag
Mr. H. M. Rainey ✓

U 011225

January 2, 1979

Mr. F. W. Baumgartner
5670 South Syracuse Circle
Plaza West - Suite 418
Greenwood Plaza
Englewood, Colorado 80111

OPHIR AREA
SAN MIGUEL COUNTY, COLORADO
Purchase Agreement
dated May 30, 1970

Dear Mr. Baumgartner:

As a matter of information, set forth below are the Serial Numbers assigned by the BLM to those unpatented mining claims which are the subject of the various documents forwarded to you by our letter of November 13, 1979:

Ruth 1-33 and 35-38	CMC 130778-130814
Ophir 1-74 and 93-109	CMC 130815-130905

Belisle Lease

Black Dragon	CMC 130911
Black Jack	CMC 130912
Frank B	CMC 130913
Frank B Millsite	CMC 130914
Defense	CMC 130915
Dorothy B	CMC 130916
Slide	CMC 130917
Vera	CMC 130918

U 011226

Mr. F. W. Baumgartner
Ophir Area-San Miguel County
January 2, 1980
Page Two

Pollman Lease

Arrow Head
Gold Queen
Little Chief
Silver Prince
Yellow Jacket

CMC 130906
CMC 130907
CMC 130908
CMC 130909
CMC 130910

Very truly yours,


H. M. Rainey
Manager of Lands

HMR/st

U 011227

November 14, 1979

To: W. R. Moran

From: H. M. Rainey 

OPHIR AREA
SAN MIGUEL COUNTY, COLORADO
Baumgartner Purchase Agreement
dated May 30, 1970
Belisle & Pollman Mining Leases
Ruth and Ophir Claims

Glen Zinn has indicated that he has no further interest in the mining claims subject to the Agreement above captioned and has recommended that we terminate our interest in the Agreement and return the claims to Baumgartner. Such termination must be accomplished prior to December 31, 1979 or we will be obligated to pay Baumgartner \$20,000.

Please indicate your concurrence in the space provided.

Concur E. H. Lindsey
E. H. Lindsey
Chief Geologist

Concur W. R. Moran
W. R. Moran
Vice President-Exploration

HMR/sm

U 011228

PS Form 3811, Jan. 1975

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

● SENDER: Complete items 1, 2, and 3.
Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one):
☒ Show to whom and date delivered. 15¢
☐ Show to whom, date, & address of delivery. 35¢
☐ RESTRICTED DELIVERY
Show to whom and date delivered. 65¢
☐ RESTRICTED DELIVERY
Show to whom, date, and address of delivery. 85¢
OPHIR AREA-SAN MIGUEL CO, COL.
PURCH AGREEMENT DATED 5/30/70

2. ARTICLE ADDRESSED TO:
Mr. F. W. Baumgartner
5670 South Syracuse Circle
Plaza West-#418/Greenwood P

3. ARTICLE DESCRIPTION: Englewood, Co. 801

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	6527	

(Always obtain signature of addressee or agent)

I have received the article described above.
SIGNATURE ☐ Addressee ☒ Authorized agent
Robert

DATE OF DELIVERY
1-20

5. ADDRESS (Complete only if requested)

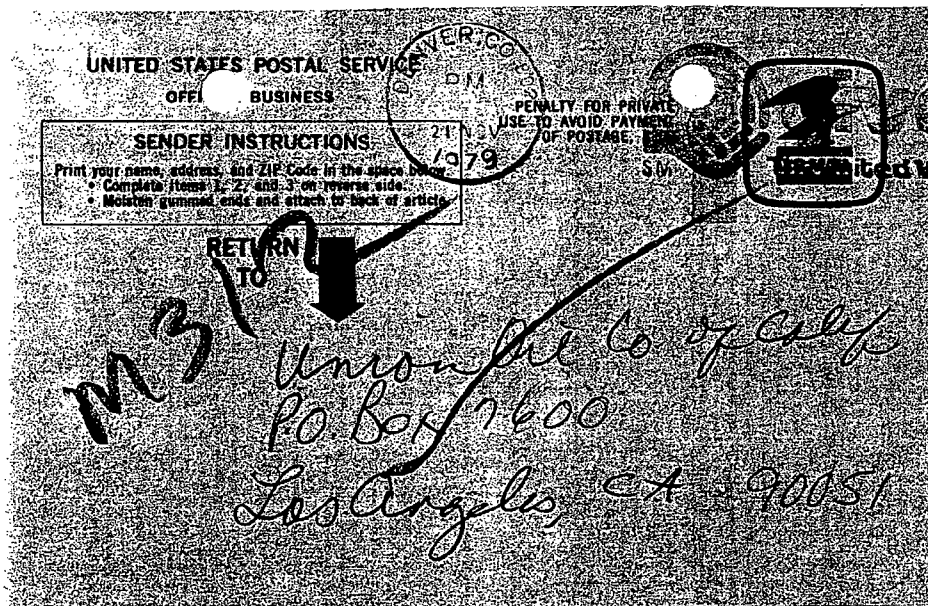
6. UNABLE TO DELIVER BECAUSE

CLERK'S INITIALS

U.S. MAIL
FEB 1975
CENTRAL
MARK
8110

☆ GPO: 195-0-358-047

U 011229



U 011230

November 13, 1979

Mr. F. W. Baumgartner
5670 South Syracuse Circle
Plaza West - Suite 418
Greenwood Plaza
Englewood, Colorado 80111

OPHIR AREA
SAN MIGUEL COUNTY, COLORADO
Purchase Agreement dated
May 30, 1970

Dear Mr. Baumgartner:

This letter will serve to notify you of the election of Minerals Exploration Company, pursuant to Article IX of subject Agreement, to terminate all of its right, title and interest in and under said Agreement effective as of the date hereof.

Enclosed for your further handling, please find the following:

1. Quitclaim Deed conveying to you all of Mineral's interest in and to unpatented lode mining claims Ruth 1-33 and 35-38 and ^{Optur}Options 1-74 and 93-109.
2. Assignment of Mining Lease conveying to you all of Mineral's interest in and to the Belisle Mining Lease dated March 2, 1967.
3. Assignment of Mining Lease conveying to you all of Mineral's interest in and to the Pollman Mining Lease dated December 21, 1966.

37
74
17
28

U 011231

Ophir Area
San Miguel County, Colorado
November 13, 1979
Page Two

4. Mineral's check for \$100.00 as liquidated damages.

By copy hereof, we are providing Mr. John H. Tippit with copies of items 1, 2 and 3 above and are requesting him to terminate that certain escrow dated May 30, 1970 and return to you all documents deposited therein by Silver Bell Industries, Inc., our predecessor in interest.

Should you have any questions in this regard, please do not hesitate to contact the undersigned.

Very truly yours,

H. M. Rainey
Manager of Lands

HMR/sm
cc: Mr. John H. Tippit/encl.
Escrow Agent
Security Life Building

Mr. Randolph Belisle
Mr. John J. Pollman

U 011232

ASSIGNMENT

KNOW ALL MEN BY THESE PRESENTS:

THAT the undersigned, as Assignor, for and in consideration of the sum of Ten Dollars (\$10.00) to it in hand paid, the receipt and adequacy of which are hereby acknowledged, does hereby grant, assign and set over to F. W. Baumgartner, 5670 South Syracuse Circle, Plaza West, Suite 418, Greenwood Plaza, Englewood, Colorado 80111, as Assignee, all of the right, title, and interest of Assignor in and to that certain Mining Lease dated March 2, 1967, by and between Randolph Belisle, as Lessor, and Franklin W. Baumgartner, as Lessee, a Notice of said Mining Lease having been recorded in Book 375 at Page 29, et seq., Official Records of San Miguel County, Colorado and covering the patented and unpatented mining claims as are more particularly described on Exhibit "A" attached hereto and by this reference made a part hereof. The interest which Assignor hereby assigns to Assignee was acquired by

U 011233

Assignor by that certain Assignment of Mining Lease by and
between Silver Bell Industries, Inc. and Assignor dated
December 5, 1978 and recorded in Book 375 at Page 669, et seq.,
of said Official Records.

TO HAVE AND TO HOLD the same to said Assignee, its
successors and assigns forever.

IN WITNESS WHEREOF, the undersigned has executed this
instrument this _____ day of _____, 1979.

MINERALS EXPLORATION COMPANY

By _____

HAS

U 011234

STATE OF CALIFORNIA)
)
) ss.
COUNTY OF LOS ANGELES)

On this _____ day of _____, 19____,
before me, a Notary Public in and for the above named county
and state, personally appeared H. M. RAINEY, known to me to
be the person whose name is subscribed to the within instru-
ment, as the Attorney-in-Fact of Minerals Exploration Company,
and acknowledged to me that he subscribed the name of
Minerals Exploration Company thereto as principal and his own
name as Attorney-in-Fact.

IN WITNESS WHEREOF, I have hereunto set my hand and
affixed my Notarial Seal, the day and year in this instrument
first above written.

Notary Public for the
State of California

U 011235

Exhibit "A" to Assignment
Dated the _____ day of _____, 1979
Between Minerals Exploration Company, Assignor
and F. W. Baumgartner, Assignee

PATENTED LODGE MINING CLAIMS
SAN MIGUEL COUNTY, COLORADO

<u>Claim Name</u>	<u>Mineral Survey Number</u>	<u>Approximate Acreage</u>
New Dominion (Except grazing rights)	16,473	10.331 acres

UNPATENTED LODGE MINING CLAIMS
SAN MIGUEL COUNTY, COLORADO

<u>Claim Name</u>	<u>Approximate Acreage</u>	<u>Mining Location Notice Recording Information</u>			
		<u>Original</u>		<u>Amended</u>	
		<u>Book</u>	<u>Page</u>	<u>Book</u>	<u>Page</u>
Black Jack)				319	489
Black Dragon)				319	490
Frank B)		122	407		
Frank B Millsite)	103.48	204	347		
Vera)	acres				
Defense)				319	486
Slide)				319	487
Dorothy B)				319	485
				319	488

All of the above claims except those portions that conflict with
U.S. Mineral Survey No. 7777, U.S. Mineral Survey No. 17726, and
U.S. Mineral Survey No. 10181 (Black Cloud Lode), all being located
in Sections 35 and 36, Township 42N., Range 9 W., and Section 31,
Township 42 N., Range 8 W., in the Iron Springs Mining District,
San Miguel County, Colorado.

U 011236

QUITCLAIM DEED

KNOW ALL MEN BY THESE PRESENTS:

THAT the undersigned MINERALS EXPLORATION COMPANY, a California corporation, whose principal office address is P. O. Box 54945, Los Angeles, California 90054, for and in consideration of Ten Dollars (\$10.00) and other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, does hereby grant, bargain, sell, remise, release and forever quitclaim unto F. W. BAUMGARTNER, 5670 South Syracuse Circle, Plaza West, Suite 418, Greenwood Plaza, Englewood, Colorado, 80111, his heirs, successors and assigns, all of its right, title and interest in and to those certain unpatented lode mining claims set forth below, covering lands situate in San Miguel County, Colorado, and having been recorded in the Official Records of said County and State as follows:

U 011237

Claim Name	Approximate Acreage	Mining Location Notice Recording Information			
		Original		Amended	
		Book	Page	Book	Page
Ruth Lode Claims)		317	528-554 incl.	336	899-935 incl.
Nos. 1-33, inclusive)	497.92 acres	330	112-131 incl.		
35-38, inclusive)	(more or less)				
Ophir Lode Claims)		317	217-225 incl.	338	104-195 incl.
Nos. 1-74, inclusive)	960.31 acres		227-287 incl.		
93-109, inclusive)	(more or less)	330	314-327 incl.		
			109-111 incl.		

TO HAVE AND TO HOLD the same, together with any and all mines, veins, lodes and mineral deposits now owned or hereafter acquired by the undersigned, its successors and assigns, extending from or into or contained in the lands on which said Claims are located; all right, title and interest of the undersigned in and to the surface and subsurface of said lands and all water, water rights, easements or rights of way nor or hereafter owned or held by the undersigned, its successors and assigns, in, upon or under said lands or

U 011238

pertaining thereto and all tenements, hereditaments and appurtenances thereof.

IN WITNESS WHEREOF, the undersigned has caused this instrument to be executed as of this _____ day of _____, 1979.

MINERALS EXPLORATION COMPANY

By _____

YDB

U 011239

STATE OF CALIFORNIA)
)
) ss.
COUNTY OF LOS ANGELES)

On this _____ day of _____, 19____,
before me, a Notary Public in and for the above named county
and state, personally appeared H. M. RAINEY, known to me to
be the person whose name is subscribed to the within instru-
ment, as the Attorney-in-Fact of Minerals Exploration Company,
and acknowledged to me that he subscribed the name of
Minerals Exploration Company thereto as principal and his own
name as Attorney-in-Fact.

IN WITNESS WHEREOF, I have hereunto set my hand and
affixed my Notarial Seal, the day and year in this instrument
first above written.

Notary Public for the
State of California

U 011240

ASSIGNMENT

KNOW ALL MEN BY THESE PRESENTS:

THAT the undersigned, as Assignor, for and in consideration of the sum of Ten Dollars (\$10.00) to it in hand paid, the receipt and adequacy of which are hereby acknowledged, does hereby grant, assign and set over to F. W. Baumgartner, 5670 South Syracuse Circle, Plaza West, Suite 418, Greenwood Plaza, Englewood, Colorado 80111, as Assignee, all of the right, title, and interest of Assignor in and to that certain Mining Lease dated December 21, 1966, by and between H. A. Pollman, et al, as Lessor, and Franklin W. Baumgartner, as Lessee, said Mining Lease being recorded in Book 375 at Page 34, et seq., Official Records of San Miguel County, Colorado, and covering the patented and unpatented mining claims as are more particularly described on Exhibit "A" attached hereto and by this reference made a part hereof. The interest which Assignor hereby assigns to Assignee was acquired by Assignor by that certain Assignment of Mining Lease by and between

U 011241

Silver Bell Industries, Inc. and Assignor dated December 5, 1978 and recorded in Book 375 at Page 665, et seq., of said Official Records.

TO HAVE AND TO HOLD the same to said Assignee, its successors and assigns forever.

IN WITNESS WHEREOF, the undersigned has executed this instrument this _____ day of _____, 1979.

MINERALS EXPLORATION COMPANY

By _____

ADB

U 011242

STATE OF CALIFORNIA)
)
) ss.
COUNTY OF LOS ANGELES)

On this _____ day of _____, 19____,
before me, a Notary Public in and for the above named county
and state, personally appeared H. M. RAINEY, known to me to
be the person whose name is subscribed to the within instru-
ment, as the Attorney-in-Fact of Minerals Exploration Company,
and acknowledged to me that he subscribed the name of
Minerals Exploration Company thereto as principal and his own
name as Attorney-in-Fact.

IN WITNESS WHEREOF, I have hereunto set my hand and
affixed my Notarial Seal, the day and year in this instrument
first above written.

Notary Public for the
State of California

U 011243

Exhibit "A" to Assignment
Dated the _____ day of _____, 1979
Between Minerals Exploration Company, Assignor
and F. W. Baumgartner, Assignee

PATENTED LODGE MINING CLAIMS
SAN MIGUEL COUNTY, COLORADO

<u>Claim Name</u>	<u>Mineral Survey Number</u>	<u>Approximate Acreage</u>
Marie Antoinette	16,421	10.183
Starlight	12,716	10.330
Attica (undivided	16,654	2.314
one-fourth interest)		
	Total	22.827 acres (more or less)

UNPATENTED LODGE MINING CLAIMS
SAN MIGUEL COUNTY, COLORADO

<u>Claim Name</u>	<u>Approximate Acreage</u>	<u>Book</u>	<u>Page</u>
Yellow Jacket)		119	606
Silver Prince)		119	608
Little Chief)	93.35 acres	119	608
Arrowhead)		119	607
Gold Queen)		119	607

Sections 35 and 36, Township 42 N., Range 9 W.,
and Section 31, Township 42 N., Range 8 W., Iron Springs
Mining District, San Miguel County, Colorado.

U 011244

November 13, 1979

To: C. M. Stubbe

From: H. M. Rainey

TERMINATION OF AUTOMATIC
PAYMENT SET-UP

With reference to W. H. Garza's memoranda to you dated February 7, 1979, please discontinue all payments to the following effective December 1, 1979:

Mr. Randolph Belisle
Ophir, Colorado 81426

Mr. John J. Pollman
Telluride, Colorado 81435

Thank-you.

HMR/sm

U 011245

Minerals Exploration Company

Exploration Group
1846 W. Grant Road, Suite 102
Tucson, Arizona 85705
Telephone: (602) 624-1572

**union⁷⁶
MINERALS**

Head Office:
P.O. Box 54945
Los Angeles, California 90054
(213) 486-6929

07 September 1979

John J. Pollman
Telluride, Colorado 81435

Re: BLM Recordation of Mining
Claims as per Title 43 Code
of Federal Regulations
Subpart 3833

Ophir Area
San Miguel County, Colorado

Dear Mr. Pollman:

This letter is intended to make you aware of the company's program to comply with the Federal Land Policy and Management Act of 1976 requiring recordation with the United States Department of the Interior, Bureau of Land Management of all unpatented mining claims located on Federal Lands before October 22, 1979. Failure to comply with the provisions of the above Act by the deadline date will render unpatented mining claims void. You are the owner of the Unpatented Lode Mining Claims Yellow Jacket, Silver Prince, Little Chief, Arrowhead and Gold Queen subject to Mining Lease dated December 21, 1966 with F.W. Baumgartner and with Minerals Exploration Company, which said claims must be filed with the Bureau of Land Management by the October deadline.

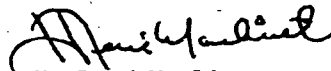
Because the filing procedures are complex and there is an element of risk that the Bureau of Land Management could reject a filing or if a defect in the filing was discovered after October 22, 1979, could declare the claims void for failure to properly file within the specified time limit. The only way to cure such an action by the Bureau of Land Management would be to totally relocate the claims being contested. Minerals Exploration Company is willing to undertake the expense of preparing the claims for filing and to pay the \$5.00 per claim filing fee, provided that you agree to indemnify and hold Minerals Exploration Company its successors and assigns, harmless from any and all liability for the loss of the claims which could result from such filing, unless caused by Minerals Exploration Company's gross negligence. It is understood that Minerals Exploration Company will exercise reasonable care and follow the general practices of the mining industry in the filing of these claims.

U 011246

Page 2
07 September 1979
Ophir Area
San Miguel County, Colorado

If you are agreeable to Minerals Exploration Company filing the claims on your behalf with the Bureau of Land Management subject to the above described terms and conditions, please execute this letter in the space provided below and return one signed copy to Minerals Exploration Company in the enclosed envelope.

Very truly yours,


H. René Moulinet
Regional Land Manager

HRM/tw
Enclosures
cc: H.M. Rainey w/o encl.
F.W. Baumgartner w/o encl.

Received and approved as of this
_____ day of September, 1979.

John J. Pollman

U 011247

PS Form 3811, Jan. 1975

● **SENDER** Complete items 1, 2, and 3.
Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one):
☒ Show to whom and date delivered 15¢
☐ Show to whom, date, & address of delivery 35¢
☐ RESTRICTED DELIVERY
Show to whom and date delivered 65¢
☐ RESTRICTED DELIVERY
Show to whom, date, and address of delivery 85¢

2. ARTICLE ADDRESSED TO:
Mr. Thomas Marshall
214 Swanson Building
8401 West Dodge Road

3. **Omaha Nebraska 68114**

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	6967	

(Always obtain signature of addressee or agent.)

I have received the article described above:
SIGNATURE: *M. Joy* ☒ Addressee ☐ Authorized agent

DATE OF DELIVERY	POSTMARK

4. ADDRESS (Complete only if requested)

5. UNABLE TO DELIVER BECAUSE	CLERK'S INITIALS

U.S. POSTAL SERVICE

U 011248

UNITED STATES POSTAL SERVICE

OFFICIAL BUSINESS

SENDER INSTRUCTIONS

Print your name, address, and ZIP Code in the space below.
• Complete items 1, 2, and 3 on reverse side.
• Moistens gummed ends and attach to back of envelope.

PENALTY FOR PRIVATE
USE TO AVOID PAYMENT
OF POSTAGE \$300



RETURN
TO



Minerals Exploration Co.
P. O. Box 54945
Los Angeles, Calif. 90054

H. M. Rainey - M312

U 011249

Minerals Exploration Company

Exploration Group
1846 W. Grant Road, Suite 102
Tucson, Arizona 85705
Telephone: (602) 624-1572

union
MINERALS

Head Office:
P.O. Box 54945
Los Angeles, California 90054
(213) 486-6929

07 September 1979

Randolph Belisle
Ophir, Colorado 81426

Re: BLM Recordation of Mining
Claims as per Title 43 Code
of Federal Regulations
Subpart 3833

Ophir Area
San Miguel County, Colorado

Dear Mr. Belisle:

This letter is intended to make you aware of the company's program to comply with the Federal Land Policy and Management Act of 1976 requiring recordation with the United States Department of the Interior, Bureau of Land Management of all unpatented mining claims located on Federal Lands before October 22, 1979. Failure to comply with the provisions of the above Act by the deadline date will render unpatented mining claims void. You are the owner of the Unpatented Lode Mining Claims Black Jack, Black Dragon, Frank B., Vera, Defense, Slide, Dorothy B. and the Frank B. Millsite, subject to Mining Lease dated March 2, 1967, with F.W. Baumgartner and with Minerals Exploration Company, which said claims must be filed with the Bureau of Land Management by the October deadline.

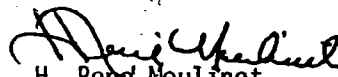
Because the filing procedures are complex and there is an element of risk that the Bureau of Land Management could reject a filing or if a defect in the filing was discovered after October 22, 1979, could declare the claims void for failure to properly file within the specified time limit. The only way to cure such an action by the Bureau of Land Management would be to totally relocate the claims being contested. Minerals Exploration Company is willing to undertake the expense of preparing the claims for filing and to pay the \$5.00 per claim filing fee, provided that you agree to indemnify and hold Minerals Exploration Company its successors and assigns, harmless from any and all liability for the loss of the claims which could result from such filing, unless caused by Minerals Exploration Company's gross negligence. It is understood that Minerals Exploration Company will exercise reasonable care and follow the general practices of the mining industry in the filing of these claims.

U 011250

Page 2
07 September 1979
Ophir Area
San Miguel County, Colorado

If you are agreeable to Minerals Exploration Company filing the claims on your behalf with the Bureau of Land Management subject to the above described terms and conditions, please execute this letter in the space provided below and return one signed copy to Minerals Exploration Company in the enclosed envelope.

Very truly yours,


H. Rene Moulinet
Regional Land Manager

HRM/tw
Enclosures

cc: ~~H.M. Rainey w/o encl.~~
F.W. Baumgartner w/o encl.

Received and approved as of this
_____ day of September, 1979.

Randolph Belisle

U 011251

August 30, 1979

To: Rene Moulinet
Attn: Terry Waters

From: H. M. Rainey

Below are the names and addresses of the owners of certain of the claims in the Ophir Area, Colorado, in which we have only a lessees' interest. These owners you will want to contact regarding the filing of the claims with the BLM.

Randolph Belisle
Ophir, Colorado 81426

Re: Unpatented Lode Mining Claims
Black Jack, Black Dragon, Frank B.
Vera, Defense, Slide and Dorothy B.

Frank B. Millsite

All of the above subject to Mining Lease dated
3/2/67 with F. W. Baumgartner.

John J. Pollman
Telluride, Colorado 81435

Re: Unpatented Lode Mining Claims
Yellow Jacket, Silver Prince, Little Chief,
Arrowhead & Gold Queen.

All of the above subject to Mining Lease dated 12/21/66 with
F. W. Baumgartner.

HMR/sm

U 011252

August 30, 1979

Mr. Randolph Belisle
Ophir, Colorado 81426

OPHIR AREA
SAN MIGUEL COUNTY, COLORADO
R. Belisle Mining Lease
dated March 2, 1967

Dear Mr. Belisle:

In reply to your letter of August 24, 1979, please be advised that our representatives in our Tucson, Arizona office are in the process of preparing the necessary documents and map pertaining to the unpatented lode mining claims subject to the above captioned lease which must be filed with the BLM on or before October 21, 1979. They will be in touch with you in this regard very shortly.

Incidentally, we have had an internal reorganization recently with the result that the lessee's interest in subject lease is now owned by MolyCorp, Inc., a wholly owned subsidiary of Union Oil Company of California.

Very truly yours,

H. M. Rainey
Manager of Lands

EMR/sm
cc: Rene Moulinet-Tucson

U 011253

H. M. RAINEY

AUG 28 1979

Ophir, Colorado
August 24, 1979

Mr. H. M. Rainey
Manager of Lands
Los Angeles, Ca.

Dear Mr. Rainey;

I know that you are aware of the fact that all un-
patented mining claims must be registered with office of
B. L. M. before the last of October.

I would like to know when your people will begin this
work.

Les Smith is doing some annual assessment work but
does not seem to know when a survey and mapping crew will
be here. This may develop into a bigger job than appears
at first glance.

Many claims were located before a map was required, also
many ties can be improved and many claims are located in an
un-surveyed township.

Any information that you wish to give me at this time
will be greatly appreciated.

I am still hoping to meet you personally some time in
the future.

With kindest regards,

Yours truly,

Randy Belisle

*Black Jack
Black Dragon
Frank B
Vera
DePina
Slide
Dorothy B*

U 011254

Mr. John H. Tippet
Escrow Agent

~~Security Life Bldg~~
~~Denver, Colorado 80202~~

(303) 443-5180

305 Park West Bldg
250 Arapahoe Street
Boulder, Colo 80302

U 011255

RECEIVED

MAR 5 1979

Burbank Ariz
Mar 2-1979

Mineral Exploration Co

Bx 54945
Los Angeles Calif 90054-

Gentlemen:

In answer to your letter
dated Feb 8 - 1979. Regarding
a copy of our agreement on
the mine

I have all my papers in
my deposit box in Telluride
and will not be going up
there until the latter part
of April. My sisters husband
passed away last week so
I will remain with her
I am sure I have no other
copy other than the one

U 011256

2

dated 1972, but when I
go to Iceland. I will be
happy to send you a copy
of whatever papers I have.
in the meantime you might
contact Les Smith in Ophi
he could give you more
information

Sorry to inconvenience you
but I have no other alternative
at the present time Thank you

yours truly
John J. Pollman
600 Houston
Boulder Ariz 85603

U 011257

August 10, 1979

To: H. Rene Moulinet

From: H. M. Rainey

OPHIR AREA
SAN MIGUEL COUNTY, COLORADO
Registration of Claims
with BLM

For your further handling and registration with the BLM, enclosed are copies of location certificates for those claims shown on the attached list. No certificates are enclosed for those claims checked in green, but a copy of the applicable amended certificate is enclosed.

Also enclosed are copies of claim maps covering the area in which the claims are located.

HMR/sm
enclosures

U 011258

RECEIVED

EB 21 1979

Ophir, Colorado
February 13, 1979

Mr. H. M. Rainey
Minerals Exploration Co.
Los Angeles, California

H. M. RAINY

FEB 26 1979

Dear Mr. Rainey:

I wish to acknowledge receipt of your letter of Feb. 8'th., with enclosed check in the amount of \$600.00.

I was aware that Minerals Exploration Company had acquired the assets of Silver Bell but your letter is the first written contact I have had with your company.

I did meet Mark last summer.

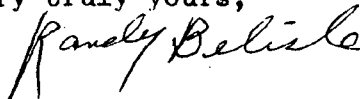
In regard to the lease, there was never a legal document or rider to the lease prepared or signed.

The agreement for a reduction in payments for a period of six months was by letter, but at the end of the six months, the \$400.00 per month payments were never restored.

Perhaps this summer you will be in this area; at that time we can sit down and discuss the lease and direct our attention to several covenants of that lease.

Thank you for your letter and I will be looking forward to meeting you in person.

Very truly yours,



Randy Belisle
Ophir, Colorado 81426

U 011259

February 8, 1979

Mr. Randolph Belisle
Ophir, Colorado 81426

Re: Ophir Area
San Miguel Co., Colorado
R. Belisle Mining Lease
dated March 2, 1967

Dear Mr. Belisle:

Please be advised that as of December 5, 1978, Minerals Exploration Company, a wholly-owned subsidiary of Union Oil Company of California, acquired substantially all of the assets of Silver Bell Industries, Inc. Among such assets is that certain Mining Lease dated March 2, 1967, by and between you, as Lessor, and Franklin W. Baumgartner, as Lessee.

The records which we have received from Silver Bell contain a letter agreement dated July 17, 1972, which amends Article II(b) of the lease to the effect that monthly advance royalty payments shall be reduced from \$400 to \$200 until the end of 1973.

While we find no additional authority for the continuance of payments in such reduced amount beyond that time, payments in the lower amount have continued to be made. Accordingly, we are enclosing our check for \$600 as payment of advance royalty for the months of December 1978 and January and February 1979.

We would appreciate a copy of such agreement as your files may contain pertaining to the right of the lessee under subject lease to pay advance royalty in an amount less than that required thereby.

U 011260

Mr. Randolph Belisle

2

February 8, 1979

We trust that our relationship will prove to be mutually satisfactory.

Very truly yours,

H. M. Rainey
Manager of Lands

HMR:mn
Enclosure

U 011261

February 8, 1979

Mr. John J. Pollman
Telluride, Colorado 81435

Re: H. A. Pollman et al
Mining Lease dated
December 2, 1966

Dear Mr. Pollman:

Please be advised that as of December 5, 1978, Minerals Exploration Company, a wholly-owned subsidiary of Union Oil Company of California, acquired substantially all of the assets of Silver Bell Industries, Inc. Among such assets is that certain Mining Lease dated December 2, 1966, by and between H. A. Pollman et al, as Lessor, and Franklin W. Baumgartner, as Lessee.

The records which we have received from Silver Bell contain a letter agreement dated July 17, 1972, which amends Article II(b) of the lease to the effect that monthly advance royalty payments shall be reduced from \$200 to \$100 until the end of 1973.

While we find no additional authority for the continuance of payments in such reduced amount beyond that time, payments in the lower amount have continued to be made. Accordingly, we are enclosing our check for \$300 as payment of advance royalty for the months of December 1978 and January and February 1979.

We would appreciate a copy of such agreement as your files may contain pertaining to the right of the lessee under subject lease to pay advance royalty in an amount less than that required thereby.

U 011262

Mr. John J. Pollman

2

February 8, 1979

We trust that our relationship will prove to be mutually satisfactory.

Very truly yours,

H. M. Rainey
Manager of Lands

HMR:mn
Enclosure

U 011263

December 17, 1970

Mr. Henry A. Pollman
Box 351
Telluride, Colorado 81435

Dear Mr. Pollman:

Our check #1886 in the amount of \$100.00 is attached to cover royalty payment as specified in your December 21, 1966 Mining Lease with F. W. Baumgartner which was assigned to our company on May 30, 1970.

I am sorry we are a bit late with this November payment. I expected to see you personally and discuss this contract with you before this time but found it impossible. I will arrange to see you on my next trip to Ophir and discuss this with you.

Kind regards and a very Merry Christmas.

Yours very truly,

SILVER BELL INDUSTRIES, INC.

Eugene H. Sanders
President

EHS:g

Enc. ck. #1886

U 011437

MANING W. COX

consulting geologist

box 158

Friday harbor, Washington 98250

(206) 378-2066

EVALUATION OF PRECIOUS METAL POTENTIAL
SILVER BELL INDUSTRIES AND ADJACENT LANDS
IRON SPRINGS MINING DISTRICT,
SAN MIGUEL COUNTY, COLORADO

September 15, 1978



Manning W. Cox

Colorado P. Eng 5388

U 011695

box 158

Friday harbor, washington 98250

(206) 378-2066

September 15, 1978

EVALUATION OF PRECIOUS METAL POTENTIAL
SILVER BELL INDUSTRIES AND ADJACENT LANDS
IRON SPRINGS MINING DISTRICT,
SAN MIGUEL COUNTY, COLORADO

SUMMARY

Substantial production of silver and gold-bearing ore has been obtained from eight vein systems in the Iron Springs District of San Miguel, Colorado. The ores occurred in steeply dipping veins consisting of quartz, calcite, and gypsum as gangue, with free gold, pyrite, argentiferous galena, tetrahedrite and sphalerite as ore minerals. The veins range from a few inches to eight feet in width, and ore shoots range from a few feet to several hundred feet in length. Assay plans are available for three of the veins at their lowest developed level; only fragmentary information is available for the others. None of the veins are of commercial interest at this time. No undeveloped veins are known that appear to merit further attention. The district as a whole has low potential for discovery of a substantial new precious metal deposit or for additions of size to known deposits.

INTRODUCTION

This report is based on 11 days field work and research in the district and in the USGS Denver office. It is accompanied by six map sheets made a part hereof. Sources of data include: my field observations guided by Mel Carlson and Les Smith of Ophir Loop, Colorado; comments by Randy Belisle, local prospector; the original mine notes of C. W. Purington made in 1896; the files of Silver Bell Industries at Ophir Loop. Because most of the mine workings are now inaccessible USGS Bulletin 1112 was relied on for surface and underground geology.

Silver Bell Industries at one time held most of the formerly productive mines of the district but litigation in recent years lost many of the patented claims. The result is fragmented holdings, particularly on the south side. Unpatented claims covering the fractions between older claims are of doubtful validity.

I have made no investigation of title and have examined the area pointed out to me on maps and in the field as representing current holdings. In addition I studied the mined properties not now owned as the best evidence as to what might be reasonably expected to be found in retained lands.

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I gratefully acknowledge assistance given me by Silver Bell and Union Minerals staff, however, this report represents solely my conclusions. This report was commissioned by E. H. Lindsey for Union Minerals and may not be used for other purposes without my permission being first obtained.

ECONOMIC FACTORS

The Iron Springs district is located along Howard Fork of the San Miguel River in the western part of the San Juan Mountains of Colorado at elevations of 9,000 to 13,000 feet above sea level. It is reached by Colorado State Highway 145, a paved road, and served by jeep trails branching from the graveled road over Ophir Pass. The closest railroad is at Montrose, Colorado, some 60 miles distant. The closest source of mining supplies is in Grand Junction, Colorado, some 140 miles distant. The nearest sale point for crude ores or concentrates from this district is El Paso, Texas.

Silver Bell has some very used mining equipment and a 30 year old 150 ton two product flotation mill located at Silver Bell Mine, Ophir Loop. There are some usable buildings at the Silver Bell Mine portal. There is a modest local mine labor force at Telluride and Uravan 15 to 50 miles distant.

Water is abundantly available. There is no available local timber, but saw timber for mining can be purchased within 50 miles. Line power is available at Ophir Loop.

The climate is usual high mountain type--cold, snowy winters with attendant serious avalanche danger, and pleasant but wet summers. Year around underground operation is practical.

The mines used shrinkage or cut and fill methods to extract ores from narrow steeply dipping veins. There is little opportunity to mechanize such operations. The ores were treated in one of several successive mills that used first gravity then flotation to concentrate and separate minerals. The usual products were a gold-rich iron concentrate, a silver-rich lead concentrate and a zinc concentrate. Recoveries, to judge from the inadequate records maintained (there never was a scale in the mill for which records are available) were 80-90% of the contained minerals. Last operations were in 1955.

Today operating costs for such ores are at least \$35 per ton for mining and \$15 per ton for milling. To break even a mineral deposit would have to return at least \$50 per ton at the mine portal. With remote smelters and supplies, and current environmental considerations the in-place metal content of the ores would have to be at least double that amount.

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GEOLOGY OF THE PRECIOUS METAL DEPOSITS

The reader is referred to USGS Bulletin 1112 for description of the general geology and mineral deposits. These are narrow typical San Juan epithermal vein deposits occurring in the middle and lower part of the Tertiary San Juan and Silverton volcanic formations, in the underlying pre Tertiary sedimentary rocks, and in Tertiary intermediate and basic intrusives that penetrate and alter the older rocks.

The west end of the district is occupied by a composite stock consisting of microgranogabbro (diorite), granodiorite and adamellite (quartz monzonite). To the east are quartz monzonite porphyries and finer grained quartz feldspar porphyries that form more or less east-west elongate dikes and sills. The invaded rocks lie flat or dip gently, mostly to the north.

The more than 4,000 feet of local relief exposes formations as old as lower Mesozoic, all hornfelsed to dense green to white siliceous rocks, and at least one of them, the Pony Express, limey and converted to skarns. Overlying these formations is the Telluride (San Miguel) conglomerate which in the eastern part of the district is impregnated with pyrite and is extensively argillized and/or silicified. In the western part of the district it is gray to tan in aspect and apparently not altered. The extent of the altered zone is shown on the surface map, Figure 1, attached. Where cut by fractures and veins this unit has been reported to contain disseminated free gold in commercial quantities. In the Camp Bird-Ironton Park area to the north, this unit is the host for extensive replacement deposits of base metal-silver ores, but no such occurrence is recorded here.

The andesite tuff-breccia units of the San Juan volcanics, succeeded by the Silverton volcanic andesite latite and in turn by the Potosi rhyolite sequence lies higher up the slopes. All of these rock units are invaded by all of the types of intrusives mentioned. In the east part of the district most of the units are pervasively pyritized, locally silicified and/or argillized to the extent that distinctions between units is impossible. In the west section of the district there is intense pyritization along the fissures but not throughout the rock.

Two sets of mineralized fractures are known: a north trending set that contains gold ores, and a northeast to east trending set that contains both gold ores and silver-base metal ores.

The gold bearing fissures were mined from the surface to depths of a few hundred feet in most cases. Although there are the usual stories of rich bonanza ores (and these may well be true) there are no reliable estimates of either size or grade of ore deposits mined. Judging from the surviving maps, plus surface and dump exposures, no ore deposit contained more than a few thousand tons. From the fact that prior to 1910 a succession of mills was erected to treat these ores, they were probably not as rich as legends would have one believe. Mineralogically they appear to have been quartz veins with

U 011698

free gold, 600-700 fine, accompanied by pyrite and little else. Veins now visible show a dark quartz brecciated and cemented by white comb quartz. Gold is reported to have occurred in the veins and in decomposed rock alongside the veins. The principal ore shoots parallel the land surface which leads me to believe that weathering and reconcentration near the surface played a large part in producing what was then mineable gold ore.

The east trending veins had various mineralogy. Some, as the Carbonero, Deadwood, and Carribbeau had galena, sphalerite, chalcopryrite, tetrahedrite and pyrite with gangue minerals of quartz, siderite, rhodocrosite, fluorite, barite, and gypsum. Others seemed to consist of quartz and pyrite with only local pods of other sulfides--the Silver Bell-Butterfly type. In these veins the depth of decomposition due to weathering was several hundred feet. Secondary enrichment of silver may have played an important role. Assay data available suggests a progressive decrease in silver content with depth and an increase in copper and/or zinc. Mining in any one deposit has reached depths of 1500 to 1800 feet. Elsewhere in the San Juans at greater depth only base metals were found.

In recent years upward exploration at the long-mined Sunnyside Mine (Standard Metals operation at Silverton, Colorado) has discovered narrow erratic very rich (to 15 ounces) gold deposits that do not crop out. These occur in an intensely mineralized area--the Sunnyside portion of the Silverton Caldera. No similar situation is present in this district. If such deposits are to be found they will be a happy bonus to other exploration as was the case at Standard Metals.

INDIVIDUAL DEPOSITS

Figure 2 shows the approximate extent of mine workings in the district and shows area locations.

North of Howard Fork

Suffolk Area. North, northeast and northwest trending quartz-pyrite veins from which free milling gold was recovered occur in the Suffolk area. The principal occurrences were the Gold King, Yellow Girl, Suffolk and Summit, but several other deposits are reported to have been mined. At the present time all mine workings are inaccessible. There is no ore material remaining on the dumps but that is not surprising since they have been scavenged for at least 50 years.

In this area Silver Bell appears to hold Yellow Boy, Gold Eagle and Hidden Treasure patented lode claims plus 10 or so unpatented lode locations. To the west, Tidal Wave and St. Louis, and to the south, Rock Islander patented lode claims are held as well as several unpatented claims. I cannot speak to any specific data on any of these claims nor was I able to find any mineralized dump material with which to confirm the presence of gold.

U 011699

Badger Area. South of the Suffolk-Gold Crown workings and low on the north side of Howard Fork west of Ophir are several workings operated fairly recently. The Crown Point, Woody, Sta. Cruz are the upper adits. Badger Tunnel at the valley floor, conceived to drive under Suffolk, only gets about half way, about 2,000 feet. These workings all develop narrow veins containing quartz, calcite, galena, sphalerite, chalcopryite. A little production is reported. Silver Bell holds only fractions in this area.

Little Eva Area. North and east trending fractures, the latter dominant, cut the Telluride conglomerate and overlying andesites in this area. These fractures, described as crushed zones in the siliceous conglomerate and braided fissures in the andesites are reported to have yielded gold and silver. I took two grab samples of the Little Eva dump No. 112 and 113. Galena, sphalerite and quartz in intensely silicified and pyritized rock of indeterminate origin were present. Sample 112 ran Au 0.25 oz, Ag 4.8 oz; sample 113, Au 0.02 oz, Ag 3.6 oz.

East of the south trending drainage of Spring Gulch, all of the rocks are intensely pyritized; to the west they are silicified and decolorized but not pyritized except along the many small fractures. Silver Bell attempted to explore the east area with a vertical core hole but lost the hole at less than 150 feet in broken ground. No assay data is available.

Silver Bell holds five patented lode mining claims and one unpatented lode location in the Little Eva area. Purington (1896) describes one, the Single Standard, as producing \$8.00 (0.40 oz) gold ore. The deposit is described as "bunches of narrow veins" in andesite with pyrite impregnations.

It seems possible, although unlikely, that the pyritized conglomerate might be sufficiently mineralized to permit bulk mining. This was the object of Silver Bell's unsuccessful drilling.

New Dominion Area. This area, just east of Spring Gulch, is underlain by intensely metamorphosed sediments, Telluride conglomerate and quartz monzonite porphyry. The New Dominion vein strikes east and west and is composed of quartz, black sphalerite with lesser amounts of siderite, galena, and pyrite. Sample No. 106 taken from the middle tunnel ore stockpile assayed Au 0.05 Oz., Ag 3.1 oz. Although the upper and lower adits, some 400 feet vertically apart, are old workings, the middle adit was driven in the fifties and sixties by R. Belisle and later Silver Bell Industries. No ore was shipped or milled. It is doubtful if there was any production from this property.

The vein although from one to four feet wide is dominantly base metal. East of New Dominion, Silver Bell drilled a -30° core hole 300 feet to explore this vein or its extension under Attica lode claim. No vein was encountered.

U 011700

Carbonero Area. Silver Bell holds 11 patented claims and a large number of unpatented lode claims in the Carbonero area. The patented claims cover seven northeast trending veins from the Attica on the south to the Boston Belle on the north and include the Starlite, Northstar, Panama, Mohawk, and Carbonero. All of these veins have been explored by tunnel levels, none of them accessible. Silver Bell has fair records on Carbonero--almost none on the others.

I found no specimens to sample for precious metal content, but a sample of iron concentrate at Carbonero Mill, No. 103, assayed Au 0.06 oz., Ag 7.9 oz.

Vhay (USGS), George Picket, C. R. Wilfley, and Charles Chase describe the Carbonero vein as from a few inches to occasionally four feet in width consisting of quartz, gypsum, fluorite and calcite as gangue, with galena, chalcopryite, and sphalerite as valuable minerals. Figures 3 and 4, plan, cross section and long section of the Carbonero, show the mine as I can reconstruct it from Silver Bell file data. Total production may be about 150,000 tons. The grade and tonnage produced is a direct consequence of the mining method. In at least the last mining attempt the vein was diluted at least three times with barren wall rock, judging from the assay data of record. Note the bottom level assays, done from DIMEA contract in 1951-53. The average is about 18 inches of vein assaying 7 oz Ag, 6-7% Pb, 2.5% Zn, 1.2% Cu.

Production by Silver Bell from 1952 to 1954 was 40,090 tons that assayed Au .017, Ag 2.20, Pb 2.84, Zn 1.06 and Cu 0.17. This was upgraded by washing and sorting prior to milling. (Note inconsistent copper assay.)

Neither clean ore or diluted mill heads would be of economic interest at this time. It seems likely, judging from the description of carbonate ore in upper levels that there is both secondary enrichment and a change in metal distribution with depth. The lower levels have more copper and zinc but less silver and lead. This is consistent with the zoning prevalent in all of the San Juan vein deposits.

Silver Bell drive pipe sampled the Ophir Consolidated Carbonero Mill tailings and for 6,000 tons got an average content of: Au 0.009 oz, Ag 1.046 oz., Pb plus Zn plus Cu 1.015%. They also sampled the part of the Shoofly (8) level dump that was not crosscut waste and for 30,000 tons averaged (only four samples) Au 0.01 oz., Ag 1.0 oz., Pb plus Zn plus Cu 1.0%.

Carbonero was operated from discovery in about 1880 to 1923 by George Picket and his associates without a mill, sorting and sacking only "first class" ore. Ophir Consolidated operated a mill from 1924 to 1929 mining all the vein. In 1951 Silver Bell reopened the mine to produce feed for its Silver Bell Mill and operated it until 1955.

^{tip}
Silver Pick. These workings are on one of several unpatented lode locations held by Silver Bell, which one I cannot tell. Two adits and short drifts develop a quartz vein up to one foot in width

U 011701

reported to contain free gold. The lower adit is open and cuts through silicified, argillized sandstone with abundant pyrite and some molybdenite smears on joint faces. The drift exposes up to six inches of quartz, but thick limonite encrustations conceal most of the vein. The formation is most likely the upper part of the Telluride conglomerate. The drift walls have been plugged to 2 feet by Silver Bell without finding any ore.

Chapman Gulch Area. Silver Bell holds four patented and a large number of unpatented lode claims in this area. Several adits develop quartz-pyrite veins in intensely pyritized and silicified rock with occasionally blebs of galena and sphalerite visible. I obtained samples of dump material at Slide and Calumet, No. 109 and 105, that assayed Au 0.10 oz., Ag 2.3 oz., and Au 0.03 oz., Ag 2.4 oz. Stopes to the surface on northwest trending fractures in altered andesite in Chapman Gulch and drifts on east-west veins reported by Purington and others indicate substantial mineralization to be present. Production is indeterminate. Widths mined are up to 3 to 4 feet at most. Vera, Hattie, Calumet, Slide, and Ophir veins have been mined. Slide is currently being worked by Belisle although no production has been made.

The small size of workings and dumps (although some lost to erosion) suggest these were pockety small shoots where present.

Duval drilled three holes on the north side of Howard Fork, one of which intersected some precious metal mineralization. This hole, Duval No. 1, 400 feet north of the Ophir Road at the mouth of Chapman Gulch, can be certainly identified on the ground (not so the other two). In the Telluride conglomerate at 220-240 feet the assays reported are 2% lead, 0.3% copper, trace gold and 1.5 oz. silver. At 260-270 feet, assays reported are 0.34 oz. silver, 0.31 oz. gold per ton. Gold and silver is not reported for the other holes.

This reinforces the possibility that the Telluride conglomerate, a favorable host elsewhere in the San Juan Mountains, is a favorable host here. Whether these be veins, replacements or disseminations I cannot tell from the logs.

Areas South of Howard Fork

Swamp Canyon Area. Silver Bell controls Calomine, Ophir, and Silver Bell unpatented lode locations in Swamp Canyon west to Nevada Gulch and east to Ophir Pass. On the east side of the canyon Purington describes the Wildflower prospect as a N 75 E pyritized zone in andesite (present Mary claim?). North of the Mary is an adit at the base of a steep side gulch cut in pyritized Telluride conglomerate, capped in the gulch by pyritized andesite. At the head of the gulch is an adit with quartz, pyrite, tetrahedrite, galena veinlets on the dump. Argentite may be present. There are no accessible workings. This gulch shows many nearly east-west fissure zones with quartz

U 011702

and pyrite. A grab sample of this outcrop material, No. 111, assays Au trace, Ag trace. A grab of vein on the upper dump No. 101 assayed Au 0.02 oz., Ag 109.4 oz.

There is evidence of strong mineralization. Although there has been no production to my knowledge, this area merits close mapping and rock chip sampling. There is some chance of developing a drill target for precious metals.

Further south in the canyon and on the west side is the Shamus O'Brien claim, apparently not in Silver Bell holdings. This part of the canyon is in metamorphosed sediments adjacent to a diorite sill. The vein matter on the dump at the upper caved portal is quartz, pyrite and galena in silicified and pyritized green sandstone. Sample No. 108 of this dump material ran Au 0.02 oz., Ag 2.7 oz.

Nevada Gulch Area. Although Silver Bell holds lode locations in this area it does not hold the patented ground where the old mines are located. Principal reported mines are Nevada, Protection, American Frenchman, Whatcheer, and Favorite.

The Protection vein east of Nevada Gulch is entirely in quartz monzonite porphyry. It strikes N 75 E, dips steeply to the north, and consists of a few inches to about one foot of quartz, pyrite and some dense dark unidentified material. Sample 114 taken from the vein at the open upper crosscut assayed Au 0.01 oz., Ag 0.04 oz. The vein has been drifted on for 250 feet without disclosing mineable ore.

Nevada vein workings are inaccessible. Judging from the dumps they are in silicified sediments and quartz monzonite porphyry. Purington stated that in 1896 there were about 2,000 feet of workings in Nevada and Whatcheer (probably Last Chance or Gold Eagle patents) that had yielded \$50,000 in sorted ore shipments. He stated the main vein was N 35 E and dipped 70 southeast but there were three other veins in a 200 foot crosscut. Ores are described as quartz, calcite, galena, sphalerite, pyrite, chalcopryite, and tetrahedrite.

There is a quartz-pyrite molybdenite stockwork at the contact of monzonite porphyry and siliceous sediments in Nevada Gulch. There is no evidence of precious metal mineralization.

Purington described the American Frenchman and American mines as being developed from a crosscut that runs 490 feet S 30 E to a vein striking N 50 E on which 1000 feet of work was done. The crosscut hit a second vein at 600 feet. The veins were extensively faulted and consist of tetrahedrite, galena, pyrite and chalcopryite grading 30 to 125 ounces silver and 40% lead--no gold. The veins were at most 18 inches wide.

This description seems to fit the present upper American Frenchman adit. There is another adit to the east and a low level tunnel, the Deadwood Tunnel, at the level of Howard Fork. My sample of ores on the Deadwood dump, No. 110, assayed Au 0.04 oz., Ag 3.6 oz.

U 011703

Purington does not describe the Favorite Mine. This property, lying on top of the hill between Nevada Gulch and Waterfall Creek, is developed by two upper tunnels and a low level crosscut from Waterfall. There is no vein matter on the lower dump, which consists entirely of white silicified and pyritized sediments, dominantly bedded quartzite.

The two upper adits follow two veins, one trending northeast and one southeast. It is said that the production comes entirely from the southeast-trending vein and was quartz free gold ore. The mine was operated at the turn of the century when an aerial tram delivered ore to a small stamp mill at Ophir. It was operated most recently by Belisle et al after 1945 when a few hundred tons of ore was screened and the coarse shipped direct. No record of production is available to me.

Waterfall Creek Area. Belisle has several unpatented and several patented lode claims on the west side of Waterfall Creek, among them the Camp Bird, Katie and Confidence claims. In 1975 Minerals Engineering Company drilled two holes in this area to explore the intersection of strong pyritic quartz veins with the Pony Express limestone in the hope of finding bedded mineralization. The cores are reported to be stored at the Silver Bell Mill. No data from this work has been available to me. Several adits are accessible and I understand are to be examined by Mark Kaestel.

I did not examine the cliff exposures and dumps immediately south of Ophir Townsite in Waterfall Creek falling on the Hummingbird and adjacent claims. Silver Bell has no property in this area. There is no record of production from these patented claims.

West of these latter claims lie the Parsons, Wyoming and Spar claims, the latter claimed both by Silver Bell and by others. Skarn float on the Spar claims, sample No. 104, assayed Au 0.01 oz., Ag 0.07 oz. A grab of siderite, galena, pyrite, sphalerite vein matter from the lower Parsons dump, sample 115, assayed Au 0.01 oz., Ag 7.4 oz. None of the several Parsons adits are accessible.

Carribbeau Area. Silver Bell apparently holds 13 patented lode claims and as many unpatented lode locations in this area. Purington's notes of 1896 describe the Carribbeau mine as being developed by two main tunnels, a lower one 2200 feet long with 300 feet of drift, and an upper one 600 feet long with 1500 feet of drift. (a 1909 newspaper account held by Mel Carlson indicates the lower drift was extended to 3000 foot length.) In 1896 it had been worked for 12 years and produced \$500,000. The vein was reported to be in diorite and limy shale. Only one vein was worked, trending N 80 E and standing nearly vertical. The vein was a stringer lode from one to eight feet wide with usually about one foot of sulfides on the footwall. In the west drift there is replacement ore in limestone. There are splits to the north going east on the vein. He describes the ore as being like that of Butterfly and Silver Bell but with more barite and copper. The vein consisted of quartz, calcite, barite, chalcopryite,

U 011704

pyrite, galena, tetrahedrite, sphalerite. The pyrite did not carry gold in the upper levels but did in the lower level. The grade of ore mined was 0.5 ounces Au and 10 ounces of silver at depth.

Purington also describes the Montezuma mine as having a 700 foot drift from a 450 foot crosscut. He says it is the same vein as Carribbeau and is in diorite except at the east end.

None of these workings is accessible. I took a specimen sample from the Montezuma Dump, No. 102, that assayed Au 0.02 oz., Ag 56.4 oz. A grab of mineralized rock from the Carribbeau lower dump, No. 107, assayed Au 0.04 oz, Ag 14.6 oz. The Carribbeau Company built a mill at the lower tunnel and apparently worked several claims in the area.

This vein appears to have been the strongest and longest mined anywhere in the district. It might be worth reopening the Carribbeau lower tunnel in order to drill under the vein at depth. However, the vein as described sounds typical of the district--very narrow, meaning that only a small production could be expected and that considerably diluted by barren waste.

To the west of Carribbeau lie Creve Couer and Magnolia veins. Maps in Silver Bell files show widths of only a few inches of silver-gold bearing quartz ore.

Silver Bell Area. Although Silver Bell holds many unpatented lode locations in the west end of the district it no longer controls the patented claims on which the apices of all of the known veins are believed to lie. Whether there are any outcrops worth attention on the other claims is unknown. With the present state of survey in the district, locating these claims is at best very imprecise. I examined the records of old mining and looked at exposures in the Butterfly No. 3 level (no part of the veins in Silver Bell are accessible), but did not crawl around the precipitous surface. I took no samples for there are extensive records, at least of the more recent mining.

Purington's 1896 notes describe several of the mines. The Butler is said to converge on the Silver Bell to the west and to have a pay-streak 12 inches wide assaying 0.6 oz gold and 10-12 oz. silver. (He says it dips to the south so it may be the Ida he is describing).

The Silver Bell vein is described as being opened by 4 levels from 10,500 feet up with 5,000 feet of workings. The vein is in decomposed diorite with quartz, calcite, barite, siderite, rhodocrosite, galena, chalcopryite, and tetrahedrite. Gold is very low and sorted ore is shipped running 65 ounces silver, 7% lead, 2% copper. The one ore shoot is about 8 feet wide and 20 feet long.

He visited Duffy workings 200 feet south of Butler but saw no vein.

In the Terrible and Butterfly there were 5,000 feet of workings but only about 250 tons of ore had been shipped. The pyritic phase of the diorite is the country rock. There are two main fissures both dipping to the south and trending about east-west. The more

U 011705

southerly (Ida?) is more solid and wider and 20 feet south of the northern one which is a stringer lode. Another vein strikes northwest. The north vein is vuggy quartz with barite, calcite, galena, pyrite and chalcopryite with a paystreak eight inches wide. The southern vein is 18 inches of saccharoidal quartz plus pyrite and free gold. The gold is associated with the chalcopryite. He says it is similar to the Badger vein north of Ophir (see USGS Bulletin 1112).

Since Purington's visit these veins that seem to form a conjugate system have been mined from their outcrops at around 11,000 feet down to 9,300 feet. Please see attached long sections, figures 5 and 6, of Ida and Butler veins for mined area and available assays. Location of the workings is given on Figure 2. Apparently early day mining was for sorted ore. Middle years mining was to feed a 35 ton mill and late stage mining was to feed a 150 ton mill at Butterfly and another similar mill at Silver Bell.

Available assays on the Ida vein show widths from 15 inches to four feet and grades of gold 0.01 to 0.04 ounces, silver 2 to 50 ounces, with not much of the higher grade. Assay data is incomplete but it appears that wide and richer shoots were short--20 to 30 feet, and most of the vein was low grade and very narrow. The Ida vein strikes generally northwest and dips to the south. It crosses through both Butler and Silver Bell veins. The total base metal content in the vein is less than 1%. This appears to be Purington's Butler vein and his south Butterfly vein.

The Butler vein dips north and strikes about east-west. Here too the base metal content, at least in the lower levels, is 1% to 5%. Assay data available show the vein from 10 to 20 inches wide assaying gold 0.01 to 0.25 ounces, silver 2 to 24 ounces. The walls of the Butler, Ida, and a third vein to the south were explored with core holes by Silver Bell. One hole intersects Butler vein 200 feet below level 14 sill where it was 42 inches thick, assaying 24 ounces silver. Were this representative of all substantial ore shoots it would be most encouraging, but samples in the old workings indicate such shoots to have been a few tens of feet in length.

Silver Bell mined these veins by shrinkage stopes about 4 feet wide which resulted in 300% to 400% dilution. Mill heads for 1951 were 0.03 oz. gold, 2.5 oz silver, 0.70% lead plus copper, zinc not reported.

CONCLUSIONS

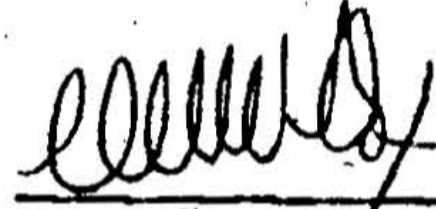
In general the Iron Springs Mining District offers few chances to develop large precious metal deposits. At the Carribbeau Mine one might reopen the lower adit and drill a few holes below the 3000 foot long stoped ground, but the chances are not very good for developing mineable ore. In the Swamp Canyon, Chapman Gulch and Spring Gulch areas where there are many fractures cutting the altered Telluride conglomerate, there is some chance of developing gold ores. The two intercepts recorded in Duval Hole 1 at Chapman Gulch reinforce this Concept. ✓

U 011706

Detailed mapping and rock chip trace element sampling may shed further light on this possibility. Perhaps drilling for molybdenum may decrease or better this chance. Right now I would not spend money on the possibility of developing a major precious metal deposit in this environment.

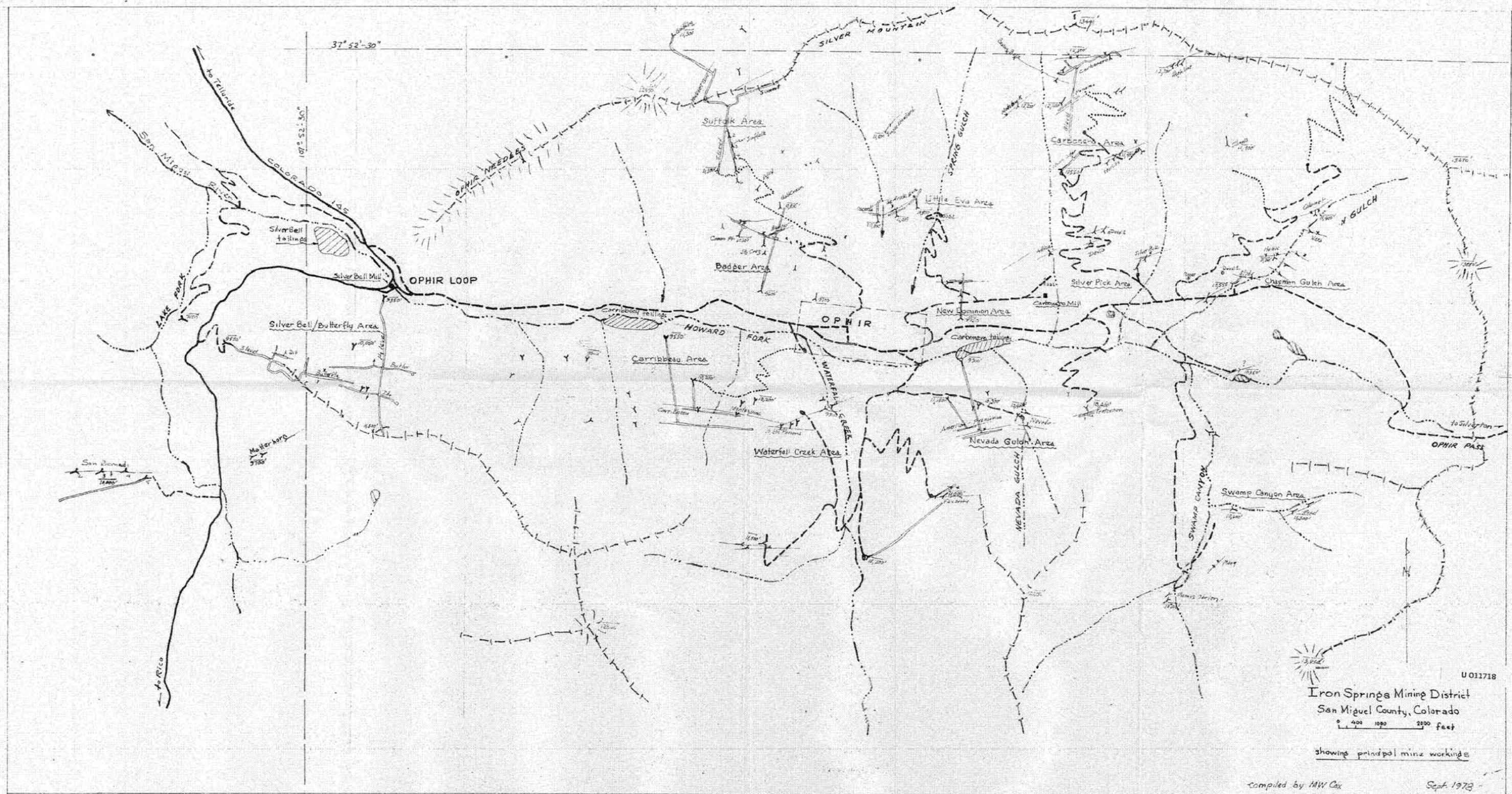
Specifically, the Carbonero, Silver Bell or New Dominion, properties last worked by Silver Bell Industries, could not now be operated with any expectation of making a profit on precious metals.

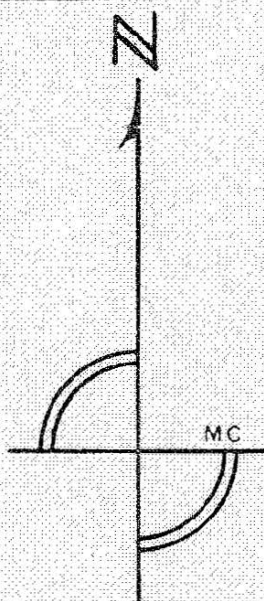
Respectfully submitted,



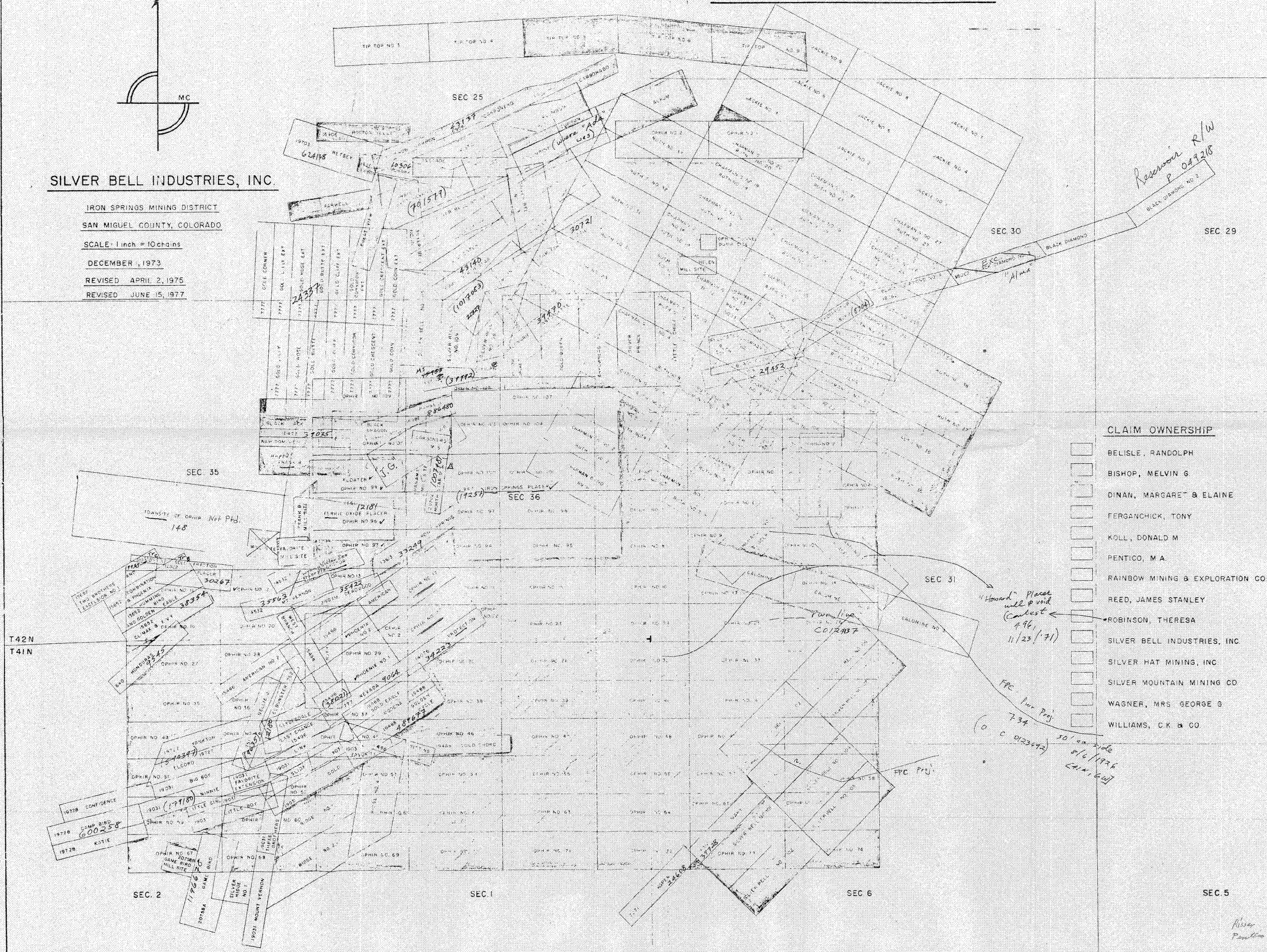
Manning W. Cox
Colorado P. Eng. 5388

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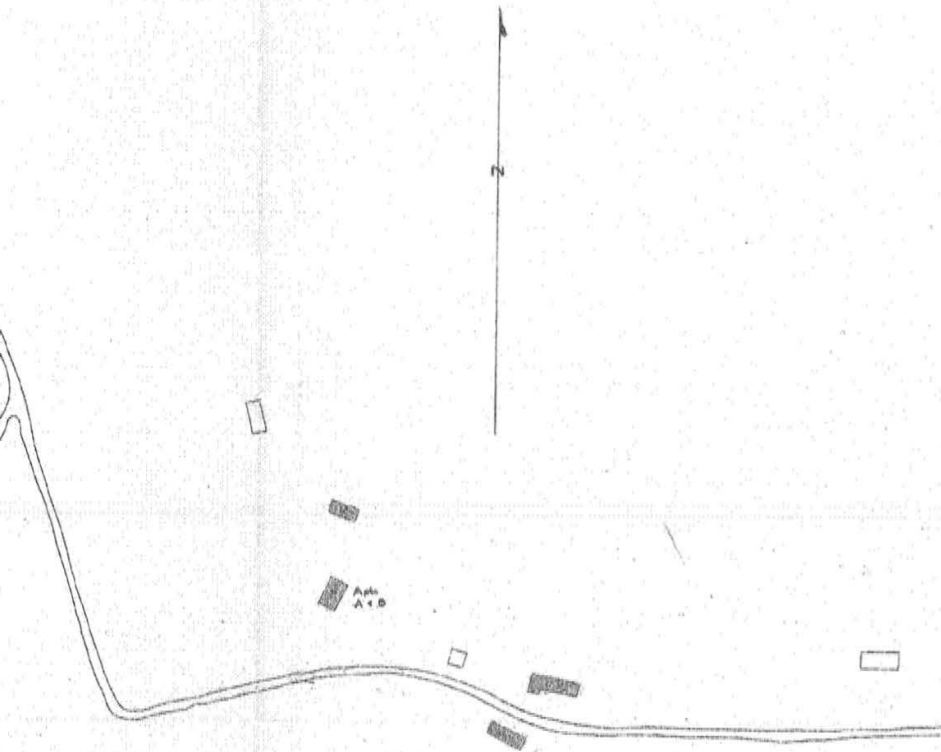


BELISLE, RANDOLPH
BISHOP, MELVIN G.
DINAN, MARGARET & ELAINE
FERGANCHICK, TONY
KOLL, DONALD M.
PENTICO, M. A.
RAINBOW MINING & EXPLORATION CO.
REED, JAMES STANLEY
ROBINSON, THERESA
SILVER BELL INDUSTRIES, INC.
SILVER HAT MINING, INC.
SILVER MOUNTAIN MINING CO.
WAGNER, MRS. GEORGE B.
WILLIAMS, C. K. & CO.

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OPHIR LOOP



TOWNSITE OF OPHIR

Property of
Ophir Corporation

OPHIR
C
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BOAL

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
Hazardous Materials and Waste Management Division



Colorado Department
of Public Health
and Environment

DRAFT
PRELIMINARY ASSESSMENT

CARBONERO MINE
SAN MIGUEL COUNTY, COLORADO

COD #

December 20, 1996

CDPHE PA/SI MANAGER: Dan Scheppers

PREPARED BY: Camille M. Farrell

REVIEWED BY: _____

DATE SUBMITTED:

SUBMITTED TO: PAT SMITH, SITE ASSESSMENT MANAGER, EPA REGION VIII

EPA APPROVAL: _____

APPROVAL DATE: _____

CDPHE 000678

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CDPHE 000680

PRELIMINARY ASSESSMENT

CARBONERO MINE SAN MIGUEL COUNTY, COLORADO

COD#

1.0 INTRODUCTION

This Preliminary Assessment (PA) of the Carbonero Mine, located approximately 2.5 miles northeast of the town of Ophir, in San Miguel County, Colorado, has been prepared to satisfy the requirements as set forth in a cooperative agreement between the U.S. Environmental Protection Agency (EPA) and the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (CDPHE).

This report is based on literature reviews, personal communications and a site visits performed on September 25 and October 7, 1996. Included in this report are the site history, site characteristics and preliminary pathway analyses.

The objectives of this PA are to:

- (1) identify and characterize potential on-site wastes;
- (2) assess the potential for contaminant migration; and,
- (3) determine potential impacts to public health and the environment.

2.0 SITE DESCRIPTION

2.1 Site Location

The Carbonero Mine is located approximately 2.5 miles northeast of the town of Ophir in San Miguel County, Colorado. Ophir is located approximately 365 miles southwest of Denver, 5 miles due south of Telluride, Colorado (Figure 1). The site consists of a draining adit at the "Shoofly" level, an associated waste rock pile adjacent thereto and a tailings pile located in the valley below. The Shoofly level occupies an area measuring 300 ft. long by 300 ft. wide, or approximately two acres. The tailings pile occupies an area measuring approximately 300 ft. by 150 ft. or 1 acre; the flume overflow/tailings spillage area measures approximately 300 feet by 100 feet, adding an additional .75 acres, for a total areal extent of 1.75 acres.

The Shoofly level of the Carbonero Mine is located in the SE1/4 of Section 25; the Carbonero tailings are located in the SE1/4 of Section 35 and SW1/4 of Section 36, Township 42 North, Range 9 West of the New Mexico Principal Meridian. The site "reference point" was chosen as the Probable Point of Entry (PPE) of the Carbonero Mine drainage into the Howard Fork River, located at 37° 46' 9.38" North latitude, 107° 48' 32.15" West longitude. The Shoofly level of the Carbonero Mine is situated at an elevation approximately 11,500 ft. and the tailings are located approximately 9,800 ft. above mean sea level.

The tailings are located approximately .3 miles east of East Ophir, in the valley bottom, immediately north of the Howard Fork. The Shoofly level of the Carbonero Mine site is located approximately one mile northeast of East Ophir. The site can be accessed by turning east from Highway 145 to the road to Ophir. Ophir is located approximately 3 miles up this road. The tailings can be seen from East Ophir and are accessible by hiking through wetlands. To access the Shoofly level, continue on the Ophir Pass Road approximately .75 miles past East Ophir, turn north (left) onto a two-track, four-wheel-drive (4WD) road, located east of the iron bog. The 4WD road switches back for approximately one mile, up the south facing slope to the Carbonero Mine. (Figures 1 and 4).

2.2 Site History

The town of Ophir was developed in 1878, by 17 prospectors exploring the region with Lt. Howard, after whom the Howard Fork of the San Miguel river was named. Ore from the mines around Ophir, producing gold, silver, lead zinc and tungsten, were shipped by burro-train over Ophir Pass to the Silverton Smelter. In 1882, a small smelter was built in Ames, 3 miles down valley, which was not successful and soon closed down. It was noted that in 1898, two cars of concentrates were shipped daily, year round. (Wolle, 1949).

The Shoofly level of the Carbonero Mine is located on the Full Moon Lode, Mineral Survey Number 20327, ownership having been recently transferred (July, 1996) from Fleet Resources to Glenn Pauls of Excelsior Minnesota (Hotchkiss Map Makers, 1935; San Miguel County Clerks Office, 1996).

The Carbonero Mine produced a total of 101,662 tons of ore containing a average of 0.24 ounce gold, 8.7 ounce silver, 6.99 percent lead, 4.7 percent zinc, and 0.16 percent copper, between 1907 and 1941 (U.S.G.S., 1959). Silver-lead mining at the Carbonero increased for about five years during the late 1920's, but falling metal prices forced the mine to shut down in 1931 (Collman, et. al., 1993).

The Carbonero had its own processing mill (North Star Millsite M.S. No. 20302, owned by Glenn Pauls) until 1931 when the mine shut down. The 50 ton per day mill used the froth-flotation process served by a two bucket aerial tramway from the Shoofly portal.

Small amounts of ore were extracted between 1934 and 1936. The last on and off cycle at the mine began in 1951 when the Silver Bell Mining Company purchased the mine and demolished the old mill and aerial tram. Ore was then hauled down the road to the Silver Bell Mine, at the Ophir Loop. All operations ceased at the Carbonero in 1954 (Collman, et. al., 1993). Appendix 8 presents more detail regarding the history of the Carbonero Mine.

The mill tailings are located approximately .3 miles downstream of the mill site, on either the Ferric Oxide Placer, M.S. 1661, owned by Randolph Belisle, or on an unpatented claim within the Uncompahgre National Forest (Hotchkiss Map Makers, 1935; San Miguel County Assessors Plats, 1996).

2.3 Site Characteristics

2.3.1 Surrounding Land Uses

The San Juan Mountains were extensively mined in the late 1800's to mid 1900's. The Idarado Mine in Telluride and on Red Mountain to the north and east of Ophir, and the Sunnyside Mine in Silverton to the southeast, operated until the late 1970's. These same mines are now completing reclamation activities. The Alta Lake tailings to the west, were reprocessed using cyanide heap-leaching technology in the 1980's and are now undergoing reclamation as well.

The San Juans are frequently visited by mountain lovers, skiers, bicycle riders, automobile and motorcycle enthusiasts, etc. Tourism and recreation have replaced mining as the region's economic base.

2.3.2 Geology/Geography

The Ophir stock is a massive igneous formation and is the prominent geologic feature in the area. The Ophir stock is a granite-like rock which contains feldspar, quartz, hornblende, and mica. This stock is overlain by sedimentary and volcanic rocks, which were uplifted, tipped, and formed the Ophir Needles.

In this area the Morrison Formation has Brushy Basin Shale, a variegated red and green claystone and siltstone, a red thin blocky sandstone, a few conglomerate beds, and rare, thin limestone beds. It includes a thin top layer equivalent of the Burro Canyon Formation.

The Carbonero Mine is located on the north side of the Howard Fork valley across from Grants Peak. The mine drainage emanating from Shoofly level of the Carbonero Mine travels a distance of approximately one mile before it enters the Howard Fork. An iron bog is located along the northern bank of the Howard Fork, upstream of its confluence with the Carbonero Mine drainage. A tailings pile is located along the northern bank of the Howard Fork, approximately a third of a mile downstream from where the Carbonero Mine drainage enters the river.

Most of the veins on the north side of the valley of the Howard Fork trend within 10 of N. 65 E., or approximately east. The vein farthest north, the Carbonero vein, strikes between N. 50 E. and N. 85 E., averaging N. 75 E.; the average dip is 80 N. The vein is as much as 36 inches wide, averaging 12 inches, and consists of one to four stringers of sulfides in gangue or altered country rock. The sulfides, in the order of decreasing abundance, are pyrite, galena, sphalerite and chalcopyrite; the nonmetallic minerals are gypsum, quartz, calcite and, rarely, rhodochrosite. The next vein south, the Panama, has an average strike of about N. 55 E., and a steep dip to either the northwest or southeast. The Panama vein is considerably narrower than the Carbonero, being only 1 to 6 inches wide but consists of almost solid sulfides (sphalerite, galena, pyrite, and chalcopyrite, in order of abundance) with a sparse gangue of quartz and gypsum. Not much can be seen of the third vein in the Carbonero Mine, that at the portal, but a fault breccia cemented by limonite and containing some quartz and galena (U.S.G.S., 1959).

Landslides are common along the Illium Valley due to unstable volcanic rocks which often contain thick layers of poorly consolidated volcanic ash, the underlying and unstable Mancos Shale, valley walls over-steepened by glacial activity, and saturation of soil and underlying rocks from mountain storms and heavy snows, adding weight and reducing friction.

Three soil types are present in the area, including Cryorthents, Skisams-Cryoborolls, and the Quander family. The Cryorthents soils are a rubble land complex, generally found on mountain side slopes. They are shallow to deep, well drained, and derived from mixed sources. Skisams-Cryoborolls is a moderately deep complex found on benches and side slopes. It is shallow, well drained, and formed from limestone or sandstone derivatives. The Quander family soils are a Varden complex on mountain sides and alluvial fans. The soil is deep and well drained. It is an alluvium formed from rhyolite, tuff, and similar volcanic rocks. The water-holding capacity is moderate and the hazard of water erosion is moderate to high (Morrison Knudsen, 1994).

2.3.3 Hydrogeology/Hydrology

The site is located in a glacial valley east of the Illium Valley, where glaciers slowly eroded volcanic and metamorphosed rocks. The glacial valley (currently contains the Howard Fork) runs roughly east to west, while the Illium valley runs roughly north to south. The glacial valley is geologically more resistant to erosion than the Illium Valley.

The Howard Fork flows west through this valley and joins the South Fork in the Illium Valley. The South Fork flows north to join the San Miguel River (Figure 4).

Ground water is present in the alluvium which is associated with the Howard Fork and the South Fork. Depth to ground water in the alluvium ranges from 20 to 60 feet according to wells logged in the region. Ground water may also be present in joints and faults associated with the volcanic intrusion, though in limited quantity.

There are two aquifers within the valley fill material: the shallow unconfined aquifer, and a deep underlying confined aquifer.

Throughout the major portion of the valley, a 10-80 foot thick blue clay is the confining layer separating the aquifers. In the southwest portion of the valley, the blue clay is absent, and volcanic material acts as the confining layer. In parts of the valley, the potentiometric surface of the confined aquifer intersects the ground surface. The crystalline basement rock, ranging between 5,000 to 20,000 feet below the ground surface, bears essentially no water (Morrison Knudsen, 1994).

2.3.4 Climate

The Carbonero Mine is located in the San Juan mountains in the south western region of Colorado Rocky Mountains. Temperatures fluctuate from highs of 80°F in July to lows of 10°F in January. Average annual precipitation in the area is 16 inches and the average evaporation is 36 inches.

3.0 PRELIMINARY PATHWAY ANALYSIS

3.1 Waste Characteristics

Three potential sources were observed on site: a draining mine adit, its associated waste rock pile, and mine tailings located in the valley below.

Drainage from the Shoofly level of the mine was estimated to be approximately 300 gallons per minute. The cone-shaped waste rock pile measured approximately 100 feet by 50 feet on the top-surface. The outslope of the rock dump, at angle of repose of approximately 45°, measured approximately 150 feet in length, situated on a hillside approaching the same slope angle. The volume of the waste rock was calculated to be approximately 27,500 cubic yards.

The adit has been safeguarded by the Mined Land Reclamation Division with a grated culvert. The mine drainage flows along the toe of the waste rock dump for a distance of approximately 150 feet. Iron precipitates coat the channel along the entire distance of the flow path into the Howard Fork, with the initial 200 feet of flow exhibiting heavier orange coating, decreasing to yellow staining on the rocks in the channel below. No noticeable difference in the Howard Fork rock staining was observed between the upstream and downstream segments of the river relative to its confluence with the mine drainage.

The mine drainage has apparently caused severe erosion in the basin in which it flows. Exposed cut banks begin where the mine drainage flows into the watershed. A large fan of fractured rock has been deposited along the Carbonero Mine flow path, especially where the slope meets the valley bottom, prior to its confluence with the river.

A tailing pile, presumably resulting from the Carbonero Mill, was observed along the southern bank of the Howard Fork, approximately 1/3 of a mile below the confluence with the Carbonero drainage with the river. The tailing pile measured approximately 300 ft. by 150 ft. by 8 ft. deep, about 1 acre containing approximately 13,333 cubic yards of material. The flume overflow/tailings spillage area measures approximately 300 ft. by 100 ft. by 2 ft. deep, adding an additional .75 acres and approximately 2,222 cubic yards of material. Thus the total areal extent of the tailings approaches 1.75 acres, and contains approximately 15,555 cubic yards of material. It is located approximately .3 miles upstream (east) of the new residential development constructed in East Ophir.

Three additional mine dumps, one associated with a draining adit (approximately 50 gallons per minute) were observed along the road ascending to the Carbonero Mine (on Iron Springs Placer, Mineral Survey Number 947). An iron-laden spring (shaft?) was observed emanating from the ground surface was located approximately 50 feet below one

of the "dry" dumps. A draining mine northwest of the tailings pile (perhaps located on the Ferric Oxide Placer, M.S. Number 1661) flows into the wetlands northwest of the tailings pile, causing iron to precipitate therein.

3.2. Soil Exposure Pathway

The site is not contained with respect to the soil exposure pathway. No known threatened or endangered species were observed on site. There are no residences or places of employment located on or within a 200 foot radius of the Site. Nearby residents were estimated from 1990 Census Bureau data as follows:

<u>Distance from Site</u> <u>(in miles)</u>	<u>Number of</u> <u>People</u>
onsite	0
0-1/4	0
1/4-1/2	0
1/2-1	75

There are no fences or other restrictions limiting access. Although the Shoofly level of the site is accessible by foot or by vehicle, it is a long steep hike or four-wheel drive journey.

There are no "terrestrial sensitive environments" located within the areas of potential contamination. There are no lands used for commercial agriculture, silviculture or livestock production or grazing located within the Site perimeter.

There are less than 100 people living within a 1-mile radius of the site.

3.3. Air Pathway

The waste rock and tailings piles are not contained with respect to the air pathway. The piles contain fine particulate material which could become airborne. Targets within the 4-mile target radius include bald eagle habitat and campgrounds on the National Forest property, and wetlands located immediately north and west of the tailings pile. Private property and residences also occur within the 4-mile target radius.

3.4. Ground Water Pathway Analysis

The sources are not contained with respect to the ground water migration pathway. The town of Ophir is located approximately .6 miles downstream of the PPE of the Carbonero Mine drainage into the Howard Fork, and approximately .3 miles downstream of the Carbonero tailings pile. The 75 residents of Ophir obtain their drinking water from a natural groundwater spring north of town (CDPHE, WQCD, 1996). Water quality data of this drinking water source, maintained by the CDPHE Water Quality Control Division - Drinking Water Section, is provided in Appendix 7. Arsenic, barium, cadmium, chromium, fluoride, lead, mercury, selenium, silver and sodium were sampled in 1985, 1990, 1991, 1993 and 1994; antimony, beryllium, cyanide, nickel, sulfate, and thallium were sampled beginning in 1993 and again in 1994. Lead and copper from the tap were sampled in 1993, 1994, and 1995. In no instance did the concentration of any of the inorganic parameters measured exceed Maximum Contamination Levels (mcls). VOCs were sampled in 1991, and both regulated and unregulated Phase I/II/V Organics were sampled in 1995; none of these compounds were detected.

One family served by a well resides approximately 2 miles below the Carbonero site (GW-1). Their well was considered the "background" well, sampled as part of the Silver Bell Site Investigation, in October, 1994 (CDPHE, 1994). A residential subdivision in Ames, Colorado is located approximately 4 miles downstream of the Carbonero site. The subdivision has two wells which withdraw water from the alluvial aquifer associated with the Lake Fork and Howard Fork. The wells are located approximately 100 yards upstream from the confluence of the Lake Fork and Howard Fork. The wells are reportedly 35 (shallow well GW-3) and 80 (deep well, GW-2) feet deep and were drilled in 1988. These wells serve a total 14 homes, or approximately 29 residents. Ground water well sampling results from the Silver Bell Site Investigation water samples are presented in Appendix 7.

The same two wells used for drinking water by the 29 residents of the Lake Fork Subdivision were sampled by the Homeowners Association in February of 1994. Those results indicate that manganese, sulfate, hardness and total dissolved solids exceeded drinking water standards. These results are also presented in Appendix 7.

The summary below compares parameters found in the wells GW-2 and GW-3 compared to the "background" well, GW-1. The parameters denoted in **bold print** below reflect the concentrations of parameters which are elevated above background concentrations.

	GW-1 background	GW-2 Lake Fork deep well	GW-3 Lake Fork shallow well
<u>Parameter</u>	<u>(ug/l)</u>	<u>(ug/l)</u>	<u>(ug/l)</u>
Iron	92.3 J	1940	93.4 J
Chromium	2.5 U	2.5 U	2.9 J
Lead	1.2 U	2.5 J	1.2 U
Manganese	3.0 J	243	221
Silver	1.6 U	1.6 U	1.9 J
Sodium	3630 J	7550 J	23100 J

Results from the Silver Bell Site Investigation indicated that iron concentrations in the Lake Fork deep well (GW-2) were three times the concentration of the background well, whereas the Lake Fork shallow well (GW-3) iron concentrations were similar to that of the background well. The concentration of iron is elevated in the deep well compared to iron concentrations measured in the two alluvial wells, possibly indicating that the deep well is drawing water from a different aquifer. However, manganese concentrations are similar in both the shallow and deep Lake Fork wells, both measuring three times higher than background concentrations, indicating an observed release.

Manganese concentrations in the "background" well were below the drinking water benchmark developed by EPA for use as screening concentrations (180 ug/l) (EPA, SCDM, 1994), whereas the downgradient wells were above the drinking water benchmark. This confirms significant concentrations of manganese reported in these wells in February, 1994 (Appendix 7). Chromium, lead, and silver in the downgradient wells were identified as observed releases as their concentrations were measured above the detection level of the background sample. However, the chromium concentration measured was lower than the corresponding drinking water benchmark. Sodium was identified as an observed release in the shallow Lake Fork well. There are no drinking water benchmarks established for iron, lead, silver and sodium.

Given the lack of any groundwater containment system at the site, the disposal methods used at the site, and the proximity of the water-bearing alluvium of the Howard Fork, contaminants could migrate into groundwater at this site.

Ground water use within the 4-mile target distance limit was estimated as follows from well logs and 1990 Census Bureau data for people/household in San Miguel County:

<u>Distance from Site (miles)</u>	<u>Number of People Served</u>
0 - ¼	0
¼ - ½	0
½ - 1	75
1 - 2	4
2 - 3	4
3 - 4	29

3.5. Surface Water Pathway Analysis

The sources are not contained with respect to the surface water pathway. Drainage from the mine flows along, thereby eroding the toe of the adjacent waste rock pile, then directly into the Howard Fork. The Howard Fork then flows immediately south of the tailings pile. Erosion channels were observed on the surface and sides of the tailings pile. A perennial drainage from the wetland north of the pile were observed flowing over the tailings pile surface, transporting tailings directly into the Howard Fork (Appendix 5).

The San Miguel River corridor is one of the few unobstructed riverine systems left in the West, and many conservation agencies are trying to preserve its "natural" condition. Nine vegetative communities have been identified within the riparian zone along the San Miguel River. There are wetlands located intermittently along the San Miguel River corridor in the 15-mile downstream segment below the site.

The Carbonero Mine does not have a permit from the Water Quality Control Division of CDPHE to discharge into the Howard Fork (CDPHE, WQCD, 1996).

The 15-mile target distance limit follows the Howard Fork, then along the South Fork, then along the San Miguel River to a location approximately 1 mile east of Sawpit, Colorado (Figure 4). Both the San Miguel River and South Fork are fisheries. Sensitive environments within this segment include bald eagle and the river otter habitats, the San Miguel River Preserve (a Nature Conservancy property), and segments of the San Miguel State Wildlife Area. In addition, there are numerous campsites along the South Fork on National Forest property. Although not considered a sensitive environment, the active hydropower plant at Ames is designated as a historic site. Willows and riparian habitats were observed immediately north and west of the tailings pile, and along the South Fork.

The Colorado Division of Minerals and Geology (DMG), in cooperation with the Colorado Department of Public Health and Environment, Water Quality Control Division, Non-Point Source Program (NPS), conducted high and low flow sampling events concentrated in the upper Howard Fork Basin, in June, 1994 and November of 1993, respectively. DMG collected aqueous samples which were analyzed for total and dissolved cadmium, copper, iron, lead, manganese and zinc at nineteen locations along the Howard Fork, its tributaries, as well as at eleven mine adits, including the Carbonero Mine and the two draining adits along the Carbonero access road. Various mine tailings, including the Carbonero mill tailings, were bracketed by the sampling site locations.

Results from the June, 1994 NPS sampling of the Howard Fork below the Carbonero Mine drainage indicate elevated concentrations (i.e., concentrations 3x greater than the sample upstream of the probable point of entry (PPE)) of total and dissolved cadmium, total iron, total manganese and total and dissolved zinc. Lead was measured above detection below the Carbonero Mine drainage PPE into the Howard Fork, whereas it was not detected at the sampling location upstream of the PPE. Low-flow analyses indicated that the Howard Fork below the PPE of the Carbonero Mine drainage was similar in concentrations to the immediate upstream sampling location for all metals analyzed. Metals concentrations in the Howard Fork downstream of the Carbonero tailings did not show any significant difference from the upstream sample location except for total lead during low flow analyses. A copy of the results are included in Appendix 7.

Comparison to the Superfund Chemical Data Matrix (SCDM) indicates that during low-flow, aquatic life benchmark concentrations were exceeded for: copper at all stations; zinc below the Carbonero drainage PPE; cadmium, lead and zinc below the Carbonero tailings PPE into the Howard Fork, as well as iron (seemingly from the iron spring draining adits). High flow analyses indicated that SCDMs freshwater aquatic life benchmarks were exceeded for: zinc at all stations; copper below the Carbonero PPE; and cadmium below the Carbonero tailings PPE (seemingly from the Iron Springs adits) (EPA, 1994).

4.0 SUMMARY

The Carbonero Mine operated from 1907 until approximately 1941; its associated mill was operating until 1931, after which time ore was transported to and milled at the Silver Bell Mill, located at the Ophir Loop. Gold, silver, copper lead and zinc were extracted. The Shoofly level of the Carbonero Mine continues to drain approximately 300 gallons per minute of mineralized water; the mine drainage flows into the Howard Fork approximately 1 mile south of the adit. The tailings pile is located immediately north of the Howard Fork, occupying an area of approximately 1.75 acres, containing approximately 15,555 cubic yards of material.

There are no people living, working or attending schools within 200 feet of the site. The risk posed to human health and the environment by the on-site and air pathways is considered minimal, if any.

Heavy metals inherent in the mine drainage, waste rock and tailings at the site are likely to have been released to the shallow unconfined aquifer. As determined from analyses resulting from the October, 1994 Silver Bell Site Investigation, concentrations of parameters measured in the well closest to the site (1 mile downstream) did not exceed drinking water standards. The deep well at Ames, located approximately 4 miles below the site, did exhibit concentrations in iron, lead and manganese greater than 3 times that of the upgradient well.

The sources are not contained with respect to the surface water pathway. Drainage from the mine flows along, thereby eroding the toe of the adjacent waste rock pile, then directly into the Howard Fork. The Howard Fork then flows immediately adjacent to the tailings pile. Erosion channels on the surface and sides of the tailings pile indicate tailings transport into the Howard Fork. Drainage from the wetlands north of the tailings was observed flowing over the tailings and transporting tailings directly into the Howard Fork.

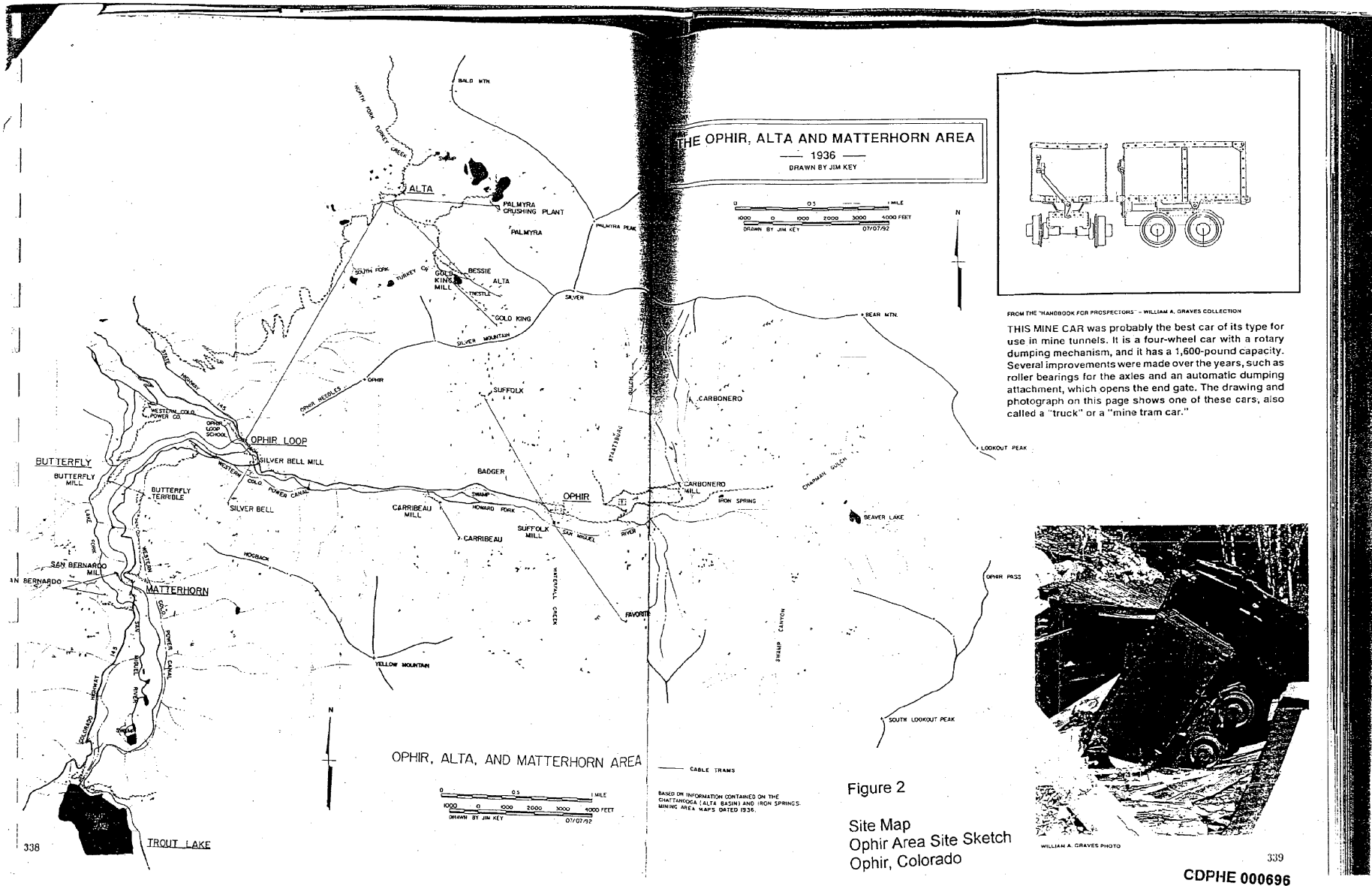
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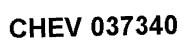
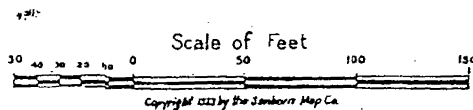
Results from the DMG NPS high-flow (June, 1994) sampling of the Howard Fork below the Carbonero Mine drainage indicate elevated concentrations (i.e., concentrations 3x greater than the sample upstream of the probable point of entry (PPE)) of total and dissolved cadmium, total iron, total manganese and total and dissolved zinc. Lead was measured above detection below the Carbonero Mine drainage PPE into the Howard Fork, whereas it was not detected at the sampling location upstream of the PPE. Low-flow analyses (November, 1993) indicated that the Howard Fork below the PPE of the Carbonero Mine drainage was similar in concentrations to the immediate upstream sampling location for all metals analyzed. Metals concentrations in the Howard Fork downstream of the Carbonero tailings did not show any significant difference from the upstream sample location except for total lead during low flow analyses. A copy of the results are included in Appendix 7.

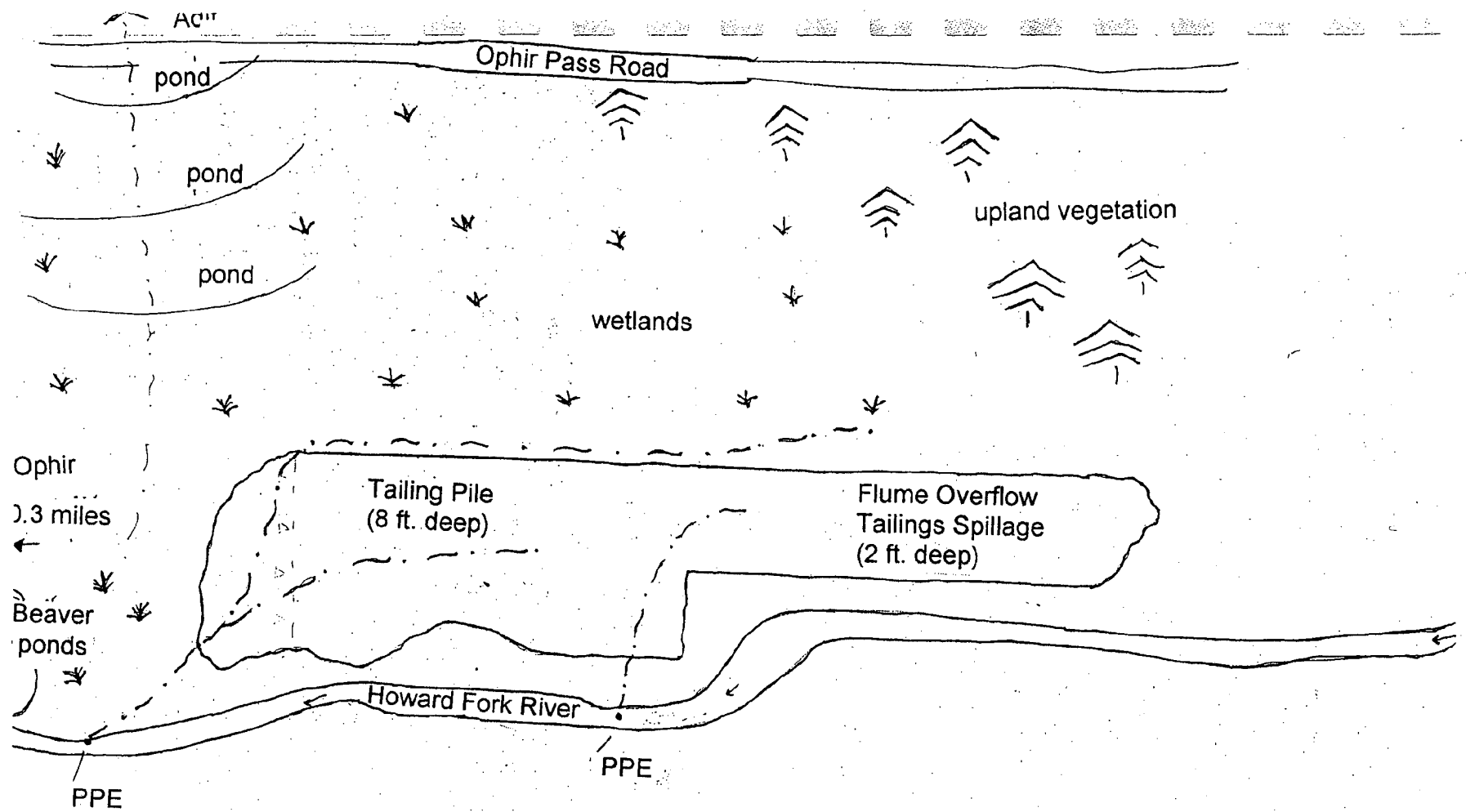
Comparison to the Superfund Chemical Data Matrix (SCDM) indicates that during low flow sampling, aquatic life benchmark concentrations were exceeded for: copper at all stations; zinc below the Carbonero drainage PPE; cadmium, lead and zinc below the Carbonero tailings PPE into the Howard Fork, as well as iron (seemingly from the iron spring draining adits). High flow analyses indicated that SCDMs freshwater aquatic life benchmarks were exceeded for: zinc at all stations; copper below the Carbonero PPE; and cadmium below the Carbonero tailings PPE (seemingly from the Iron Springs adits) (EPA, 1993).

5.0 REFERENCES

- Collman, Russ, McCoy, Dell A., and Graves, William A., 1993. *The R.G.S. Story - Rio Grande Southern - Volume III: Over the Bridges...Vance Junction to Ophir*. Sundance Publications Limited, Denver, Colorado.
- Colorado Division of Water Resources. 1992. Applications and Permits Location Listing, December, 1992.
- Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, 1995. *Site Inspection Analytical Results Report of the Silver Bell Mine/Mill, San Miguel County, Colorado*. CERCLIS # COD980069645.
- Colorado Department of Public Health and Environment, Water Quality Control Division, 1996. Telephone conversation with Heather Holmes. September 27.
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- Hotchkiss Map Makers, 1935. *Map of the San Juan Triangle*.
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- San Miguel County Clerks Office, 1996. Land ownership records.
- Trails Illustrated Topo Maps, 1995. No. 141: *Silverton, Ouray, Telluride, Lake City Colorado*. Evergreen, Colorado.
- U.S. EPA, 1994. *Superfund Chemical Data Matrix*. June.
- United States Geological Survey. 1955. *Topographic Map (7.5 Minute Series); Ophir Quadrangle*.
- United States Geological Survey. 1959. *Contributions to Economic Geology, 1959; Geology and Mineral Deposits of the Area South of Telluride Colorado*. Bulletin 112-G. U.S. Government Printing Office.
- Wolle, Muriel Vincent, 1949. *Stampede to Timberline*. Porter Lithographing Company, Denver, Colorado.







1" = 100'

N ↑

Figure 3b

Site Sketch Map
Carbonero Tailings
Ophir, Colorado

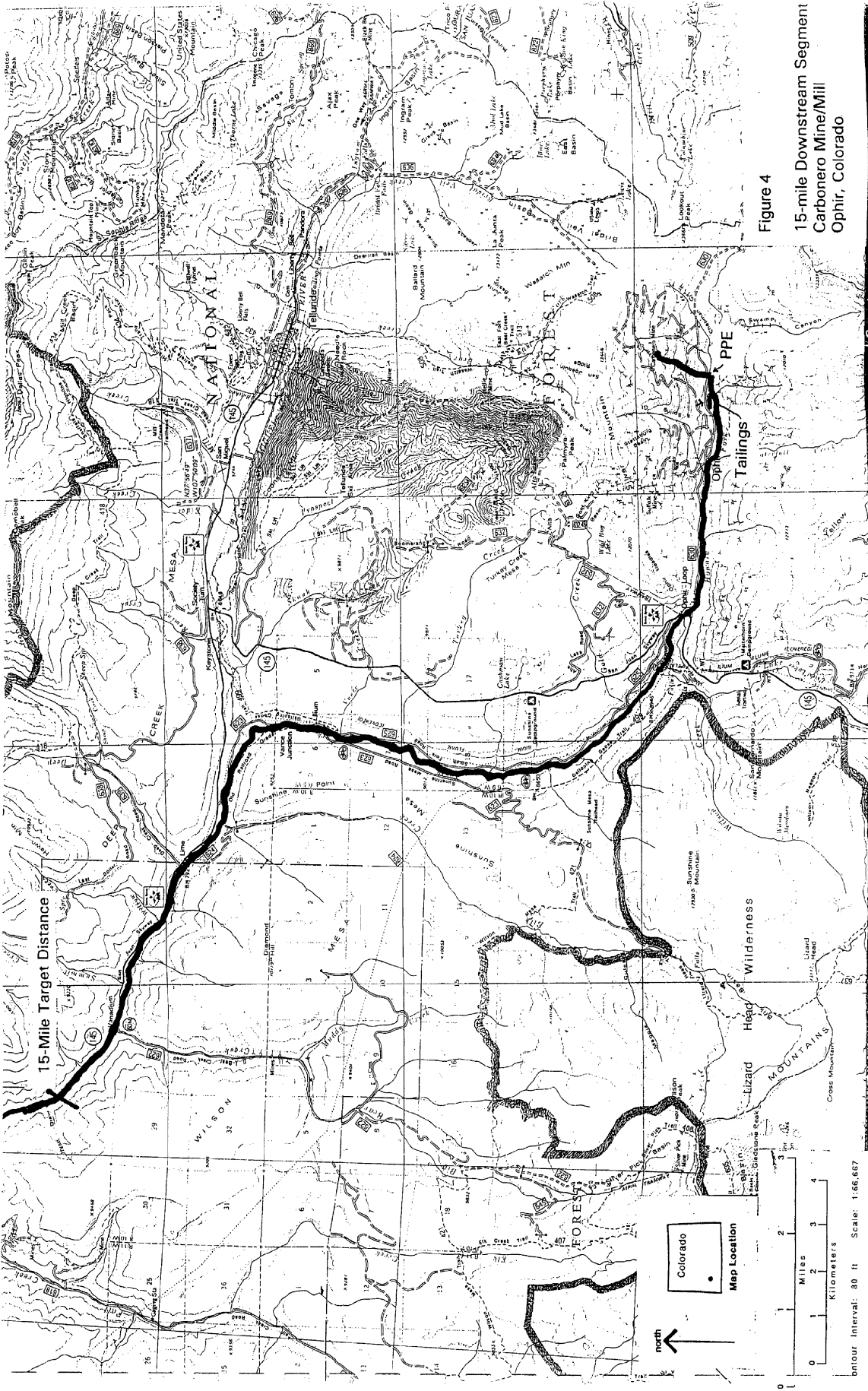


Figure 4


15-mile Downstream Segment
Carbonero Mine/Mill
Ophir, Colorado

APPENDIX 1

EPA PRELIMINARY ASSESSMENT FORM

CDPHE 000700

OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

 Potential Hazardous Waste Site Preliminary Assessment Form		Identification	
		State: <u>CO</u>	CERCLIS Number:
		CERCLIS Discovery Date:	
1. General Site Information			
Name: <u>Carbonero Mine</u>		Street Address:	
City: <u>Ophir</u>	State: <u>CO</u>	Zip Code: <u>81426</u>	County: <u>San Miguel</u>
Latitude: <u>37° 46' 4" 38" N</u>	Longitude: <u>107° 48' 32.5" W</u>	Approximate Area of Site: <u>1.75</u> Acres	Status of Site: <input type="checkbox"/> Active <input type="checkbox"/> Not Specified <input checked="" type="checkbox"/> Inactive <input type="checkbox"/> NA (GW plume, etc.)
		<u>76,230</u> Square Ft	
2. Owner/Operator Information			
Owner: <u>Glenn Kauls (North Star; MS # 20327)</u>		Operator: <u>N/A - Inactive</u>	
Street Address: <u>Star Route 1, Silver Fork</u>		Street Address:	
City: <u>Brighton</u>		City:	
State: <u>UT</u>	Zip Code: <u>84121</u>	Telephone: <u>(801) 645-8511</u>	State: <u>CO</u>
Type of Ownership: <input checked="" type="checkbox"/> Private <input type="checkbox"/> Federal Agency <input type="checkbox"/> State <input type="checkbox"/> Indian		How Initially Identified: <input type="checkbox"/> Citizen Complaint <input type="checkbox"/> PA Petition <input type="checkbox"/> State/Local Program <input type="checkbox"/> RCRA/CERCLA Notification	
		<input type="checkbox"/> Federal Program <input type="checkbox"/> Incidental <input type="checkbox"/> Not Specified <input type="checkbox"/> Other	
3. Site Evaluator Information			
Name of Evaluator: <u>Camille Farrell</u>		Agency/Organization: <u>CDPHE</u>	
Date Prepared: <u>10/18/96</u>			
Street Address: <u>P.O. Box 2927</u>		City: <u>Telluride</u>	State: <u>CO</u>
Name of EPA or State Agency Contact: <u>Pat Smith</u>		Street Address: <u>999 18th St.; 8-HNM-S.Y</u>	
City: <u>Denver</u>		State: <u>CO</u>	Telephone: <u>(303) 312 6082</u>
4. Site Disposition (for EPA use only)			
Emergency Response/Removal Assessment Recommendation: <input type="checkbox"/> Yes <input type="checkbox"/> No Date: _____		CERCLIS Recommendation: <input type="checkbox"/> Higher Priority SI <input type="checkbox"/> Lower Priority SI <input type="checkbox"/> NFRAP <input type="checkbox"/> RCRA <input type="checkbox"/> Other Date: _____	
		Signature: Name (typed): Position:	



Potential Hazardous Waste Site
Preliminary Assessment Form - Page 2 of 4

CERCLIS Number:

5. General Site Characteristics

Predominant Land Uses Within 1 Mile of Site (check all that apply):

- ☐ Industrial ☐ Agriculture ☐ DOI
☐ Commercial ☒ Mining ☐ Other Federal Facility
☒ Residential ☐ DOD
☒ Forest/Fields ☐ DOE ☐ Other _____

Site Setting:

- ☐ Urban
☐ Suburban
☒ Rural

Years of Operation:

Beginning Year 1977

Ending Year 1941

☐ Unknown

Type of Site Operations (check all that apply):

- ☐ Manufacturing (must check subcategory)
☐ Lumber and Wood Products
☐ Inorganic Chemicals
☐ Plastic and/or Rubber Products
☐ Paints, Varnishes
☐ Industrial Organic Chemicals
☐ Agricultural Chemicals
(e.g., pesticides, fertilizers)
☐ Miscellaneous Chemical Products
(e.g., adhesives, explosives, ink)
☐ Primary Metals
☐ Metal Coating, Plating, Engraving
☐ Metal Forging, Stamping
☐ Fabricated Structural Metal Products
☐ Electronic Equipment
☐ Other Manufacturing
☒ Mining
☒ Metals
☐ Coal
☐ Oil and Gas
☐ Non-metallic Minerals

- ☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill _____
☐ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _____
☐ RCRA
☐ Treatment, Storage, or Disposal
☐ Large Quantity Generator
☐ Small Quantity Generator
☐ Subtitle D
☐ Municipal
☐ Industrial
☐ "Converter"
☐ "Protective Filer"
☐ "Non- or Late Filer"
☐ Not Specified
☐ Other _____

Waste Generated:

- ☐ Onsite
☐ Offsite
☒ Onsite and Offsite

Waste Deposition Authorized By:

- ☐ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☒ Unknown

Waste Accessible to the Public:

- ☒ Yes
☐ No

Distance to Nearest Dwelling,
School, or Workplace:

1320 Feet

6. Waste Characteristics Information

Source Type:

(check all that apply)

- ☐ Landfill
☐ Surface Impoundment
☐ Drums
☐ Tanks and Non-Drum Containers
☐ Chemical Waste Pile
☐ Scrap Metal or Junk Pile
☒ Tailings Pile
☐ Trash Pile (open dump)
☐ Land Treatment
☐ Contaminated Ground Water Plume
(unidentified source)
☐ Contaminated Surface Water/Sediment
(unidentified source)
☐ Contaminated Soil
☒ Other mine waste
☐ No Sources

Source Waste Quantity:

(include units)

15,555 yd³

27,500 yd³

Tier *

✓

✓

General Types of Waste (check all that apply):

- ☐ Metals ☐ Pesticides/Herbicides
☐ Organics ☐ Acids/Bases
☐ Inorganics ☐ Oil Waste
☐ Solvents ☐ Municipal Waste
☐ Paints/Pigments ☒ Mining Waste
☐ Laboratory/Hospital Waste ☐ Explosives
☐ Radioactive Waste ☐ Other _____
☐ Construction/Demolition
Waste

Physical State of Waste as Deposited (check all that
apply):

- ☒ Solid ☐ Sludge ☐ Powder
☐ Liquid ☐ Gas

* C = Constituent, W = Wastestream, V = Volume, A = Area



Potential Hazardous Waste Site
Preliminary Assessment Form - Page 3 of 4

CERCLIS Number:

7. Ground Water Pathway

Is Ground Water Used for Drinking Water Within 4 Miles:

☒ Yes
☐ No

Type of Drinking Water Wells Within 4 Miles (check all that apply):

☒ Municipal
☒ Private
☐ None

Is There a Suspected Release to Ground Water:

☒ Yes
☐ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☒ No

If Yes, Enter Primary Target Population:

_____ People

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - ¼ Mile	<u>0</u>
> ¼ - ½ Mile	<u>0</u>
> ½ - 1 Mile	<u>75</u>
> 1 - 2 Miles	<u>4</u>
> 2 - 3 Miles	<u>4</u>
> 3 - 4 Miles	<u>29</u>
Total Within 4 Miles	<u>112</u>

Depth to Shallowest Aquifer:

35 Feet

Karst Terrain/Aquifer Present:

☐ Yes
☒ No

Nearest Designated Wellhead Protection Area:

☐ Underlata Site
☐ > 0 - 4 Miles
☒ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☐ Stream ☒ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other _____

Shortest Overland Distance From Any Source to Surface Water:

15 Feet

0.03 Miles

Is There a Suspected Release to Surface Water:

☒ Yes
☐ No

Site is Located in:

☒ Annual - 10 yr Floodplain
☐ > 10 yr - 100 yr Floodplain
☐ > 100 yr - 500 yr Floodplain
☐ > 500 yr Floodplain

Drinking Water Intakes Located Along the Surface Water Migration Path:

☐ Yes
☒ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☒ No

If Yes, Enter Population Served by Primary Target Intakes:

_____ People

List All Secondary Target Drinking Water Intakes:

Name	Water Body	Flow (cfs)	Population Served
------	------------	------------	-------------------

Total within 15 Miles _____

Fisheries Located Along the Surface Water Migration Path:

☒ Yes
☐ No

Have Primary Target Fisheries Been Identified:

☒ Yes
☐ No

List All Secondary Target Fisheries:

Water Body/Fishery Name	Flow (cfs)
-------------------------	------------

Lake Fork

San Miguel R.



Potential Hazardous Waste Site
Preliminary Assessment Form - Page 4 of 4

CERCLIS Number:

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☒ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☒ Yes
☐ No

List Secondary Target Wetlands:

Water Body	Flow (cfs)	Proximity Miles
Howard Fork		
South Fork		
San Miguel R.		

Other Sensitive Environments Located Along the Surface Water Migration Path:

☒ Yes
☐ No

Have Primary Target Sensitive Environments Been Identified:

☒ Yes
☐ No

List Secondary Target Sensitive Environments:

Water Body	Flow (cfs)	Sensitive Environment Type
San Miguel R.		End. Spp. Habitat
S. Fork		River Preserve
S. Fork		State Wildlife Area

9. Soil Exposure Pathway

Are People Occupying Residences or
Attending School or Daycare on or Within 200
Feet of Areas of Known or Suspected
Contamination:

☐ Yes
☒ No

If Yes, Enter Total Resident Population:

_____ People

Number of Workers Onsite:

☒ None
☐ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Have Terrestrial Sensitive Environments Been Identified on
or Within 200 Feet of Areas of Known or Suspected
Contamination:

☐ Yes
☒ No

If Yes, List Each Terrestrial Sensitive Environment:

10. Air Pathway

Is There a Suspected Release to Air:

☐ Yes
☒ No

Enter Total Population on or Within:

Onsite	0
0 - 1/4 Mile	0
> 1/4 - 1/2 Mile	0
> 1/2 - 1 Mile	75
> 1 - 2 Miles	4
> 2 - 3 Miles	4
> 3 - 4 Miles	29
Total Within 4 Miles	112

Wetlands Located Within 4 Miles of the Site:

☒ Yes
☐ No

Other Sensitive Environments Located Within 4 Miles of the Site:

☐ Yes
☒ No

List All Sensitive Environments Within 1/4 Mile of the Site:

Distance	Sensitive Environment Type/Wetlands Area (acres)
Onsite	
0 - 1/4 Mile	
> 1/4 - 1/2 Mile	

APPENDIX 2

CERCLA ELIGIBILITY WORKSHEET

CDPHE 000705

**EPA Guidance
EPA Region VIII
August 1993**

**ATTACHMENT III
CERCLA ELIGIBILITY WORKSHEET**

CDPHE 000706

PA Guidance
EPA Region VIII
August 1993

CERCLA Eligibility Worksheet

Site Name Carbonero Mine

City Ophir

State Colorado

EPA ID Number _____

Note: The site is automatically CERCLA eligible if it is a Federally owned or operated RCRA site.

I. CERCLA Eligibility

Did the facility cease operations prior to November 19, 1980? Yes

If YES, then STOP. The facility is probably a CERCLA site.

If NO, continue to Part II.

II. RCRA Deferral Factors

Did the facility file a RCRA Part A application? _____

If YES:

1. Does the facility currently have interim status? _____
2. Did the facility withdraw its Part A application? _____
3. Is the facility a known or possible protective filer? _____
(filed in error)
4. Does the facility have a RCRA operating or post-closure permit? _____
5. Is the facility a late (after 11/19/80) or non-filer that has been identified by the EPA or the State? (facility did not know it needed to file under RCRA). _____

CDPHE 000707

PA GUIDANCE
EPA Region VIII
August 1993

Type of facility:

Generator ____ Transporter ____ Recycler ____

TSD (Treatment/Storage/Disposal) ____

If all answers to questions 1, 2, and 3 are NO, STOP. The facility is a CERCLA eligible site.

If answer to #2 or #3 is YES, STOP. The facility is a CERCLA eligible site.

If answer to #2 and #3 are NO and any other answer is YES, site is RCRA, continue to Part III.

III. RCRA Sites Eligible for the NPL

Has the facility owner filed for bankruptcy under Federal or State laws? ____

Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action? ____

Is the facility a TSD that converted to a generator, transporter or recycler facility after November 19, 1980? ____

IV. Exempted substances:

Does the release involve hazardous substances other than petroleum? ____

**PA Guidance
EPA Region VIII
August 1993**

V. Other programs: The site may never reach the NPL or be a candidate for removal. We need to be able to refer it to any other programs in EPA or state agencies which may have jurisdiction, and thus be able to effect a cleanup. Responses should summarize available information pertaining to the question. Include information in existing files in these programs as part of the PA. Answer all that apply.

Is there an owner or operator?

NPDES-CWA: Is there a discharge water containing pollutants with surface water through a point source (pipe, ditch, channel, conduit, etc.)?

CWA (404): Have fill or dredged material been deposited in a wetland or on the banks of a stream? Is there evidence of heavy equipment operating in ponds, streams or wetlands?

UIC-SDWA: Are fluids being disposed of to the subsurface through a well, cesspool, septic system, pit, etc.?

TSCA: Is it suspected that there are PCB's on the site which came from a source with greater than 50 ppm PCB's such as oil from electrical transformers or capacitors?

FIFRA: Is there a suspected release of pesticides from a pesticide storage site? Are there pesticide containers on site?

CDPHE 000709

**PA Guidance
EPA Region VIII
August 1993**

RCRA (D) Is there an owner or operator who is obligated to manage solid waste storage or disposal units under State solid waste or ground water protection regulations?

UST: Is it suspected that there is a leaking underground storage tank containing a product which is a hazardous substance or petroleum?

APPENDIX 3
PA QUESTIONNAIRE

CDPHE 000711

PA WORKSHEET

Site Name Carbonero Mine City, State Ophir, Colorado

CERCLIS # _____

Reported by Camille Farrell, CO Dept. of Public Health & Environment Date December 20, 1996

HIGHLIGHTS

A.) IS THERE QUALITATIVE OR QUANTITATIVE EVIDENCE OF A RELEASE TO AIR, SURFACE WATER, GROUND WATER, OR SURFACE SOIL? DESCRIBE BRIEFLY.

More detail in items GW-1 (for GW), SW-5 (for SW), A-1 (for air), and SE-1 (for soil exposure pathway).

Yes. The draining "Shoofly" adit of the Carbonero mine flows directly into the Howard Fork River. The Carbonero tailings, located immediately north of the Howard Fork, was observed to have overland flow transporting entrained tailings materials into the river. Additionally, the tailings are located in a wetland, likely affecting the ground water. Sampling conducted by the Division of Minerals and Geology in 1993 and 1994 indicated elevated concentrations of metals in surface water below the PPE of the draining adit during high flow and the PPE of overland flow across the tailings pile into the Howard Fork for lead only during low flow. Analyses of an artesian spring used by the town of Ophir, located approximately 0.6 miles below the site, indicate that metals analyzed all met drinking water standards; Organic parameters analyzed for were not detected.

B.) IS THERE EVIDENCE OF AN IMPACTED TARGET POPULATION? DESCRIBE.

PATHWAY	TARGET	none/target size	BRIEF DESCRIPTION	MORE DISCUSSION IN
Ground Water	public drinking water supply	N/A		
	domestic drinking water supply	N/A		
Surface Water	drinking water	N/A		
	fishery	yes	moderate fishery in the S.Fork of the San Miguel River and good fishery in the mainstem of the San Miguel River	
	sens. env. wetlands	intermittent	wetlands intermittent in 15-mi. downstream segment	
Soil Exposure	people w/in 200'	no		
	terrestrial sens. env.	no		
Air	population	no		

SITE INFORMATION

G-1. Directions to the site (from nearest easily recognized point.)

The tailings are located approximately .3 miles east of East Ophir, in the valley bottom, immediately north of the Howard Fork. The Shoofly level of the Carbonero Mine site is located approximately one mile northeast of East Ophir. The site can be accessed by turning east from Highway 145 to the road to Ophir. Ophir is located approximately 3 miles up this road. The tailings can be seen from East Ophir and are accessible by hiking through wetlands. To access the Shoofly level, continue on the Ophir Pass Road approximately .75 miles past East Ophir, turn north (left) onto a two-track, four-wheel-drive (4WD) road, located east of the iron bog. The 4WD road switches back for approximately one mile, up the south facing slope to the Carbonero Mine. (Figures 1 and 4).

G-2. Are there other potential sources in the neighborhood to be aware of as the site is evaluated? e.g., Is the site in an industrial area, near a railroad, along a highway? Are sources with similar contaminants to this site in the vicinity?

Yes. The area around Ophir is known as the Ophir Mining district. There are other draining mines and associated waste rock piles both upstream and downstream of Ophir, and additional mill tailings downstream of Ophir. A watershed based Site Investigation would provide a more descriptive characterization of the site and potential impacts than numerous individual Site Investigations.

Background/Operating History

G-3. Describe the operating history of the site.

The town of Ophir was developed in 1878, by 17 prospectors exploring the region with Lt. Howard, after whom the Howard Fork of the San Miguel river was named. Ore from the mines around Ophir, producing gold, silver, lead zinc and tungsten, were shipped by burro-train over Ophir Pass to the Silverton Smelter. In 1882, a small smelter was built in Ames, 3 miles down valley, which was not successful and soon closed down. It was noted that in 1898, two cars of concentrates were shipped daily, year round. (Wolle, 1949).

The Shoofly level of the Carbonero Mine is located on the Full Moon Lode, Mineral Survey Number 20327, ownership having been recently transferred (July, 1996) from Fleet Resources to Glenn Pauls of Excelsior Minnesota (Hotchkiss Map Makers, 1935; San Miguel County Clerks Office, 1996).

The Carbonero Mine produced a total of 101,662 tons of ore containing a average of 0.24 ounce gold, 8.7 ounce silver, 6.99 percent lead, 4.7 percent zinc, and 0.16 percent copper, between 1907 and 1941 (U.S.G.S., 1959). Silver-lead mining at the Carbonero increased for about five years during the late 1920's, but falling metal prices forced the mine to shut down in 1931 (Collman, et. al., 1993).

The Carbonero had its own processing mill (North Star Millsite M.S. No. 20302, owned by Glenn Pauls) until 1931 when the mine shut down. The 50 ton per day mill used the froth-flotation process served by a two bucket aerial tramway from the Shoofly portal.

Small amounts of ore were extracted between 1934 and 1936. The last on and off cycle at the mine began in 1951 when the Silver Bell Mining Company purchased the mine and demolished the old mill and aerial tram. Ore was then hauled down the road to the Silver Bell Mine, at the Ophir Loop. All operations ceased at the Carbonero in 1954 (Collman, et. al., 1993). Appendix 8 presents more detail regarding the history of the Carbonero Mine.

The mill tailings are located approximately .3 miles downstream of the mill site, on either the Ferric Oxide Placer, M.S. 1661, owned by Randolph Belisle, or on an unpatented claim within the Uncompahgre National Forest (Hotchkiss Map Makers, 1935; San Miguel County Assessors Plats, 1996).

Source of information:

Collman, Russ, McCoy, Dell A., and Graves, William A., 1993. *The R.G.S. Story - Rio Grande Southern - Over the Bridges...Vance Junction to Ophir*. Sundance Publications Limited, Denver, Colorado.

Hotchkiss Map Makers, 1935. *Map of the San Juan Triangle*.

San Miguel County Clerks Office, 1996. Land ownership records.

Wolle, Muriel Vincent, 1949. *Stampede to Timberline*. Porter Lithographing Company, Denver, Colorado.

G-4. Describe site and nature of operations (property size, manufacturing, waste disposal, storage etc.):

The Carbonero Mine operated from 1907 until approximately 1941; its associated mill was operating until 1931, after which time ore was transported to and milled at the Silver Bell Mill, located at the Ophir Loop. Gold, silver, copper lead and zinc were extracted. The Shoo-fly level of the Carbonero Mine continues to drain approximately 300 gallons per minute of mineralized water; the mine drainage flows into the Howard Fork approximately 1 mile south of the adit. The tailings pile is located immediately north of the Howard Fork, occupying an area of approximately 1.75 acres, containing approximately 15,555 cubic yards of material.

Source of information:

Collman, Russ, McCoy, Dell A., and Graves, William A., 1993. *The R.G.S. Story - Rio Grande Southern - Volume III: Over the Bridges...Vance Junction to Ophir*. Sundance Publications Limited, Denver, Colorado.

G-5. Describe any emergency or remedial actions that have occurred at the site:

N/A

Source of information:

G-6. Are there records or knowledge of accidents or spills involving site wastes? Are there Emergency Response Notification (ERNS) reports for this location?

No

Source of information:

G-7. Describe existing sampling data and briefly summarize data quality (e.g. sample objective, age/comparability, analytical methods, detection limits, QA/QC validity):

The Colorado Division of Minerals and Geology (DMG), in cooperation with the Colorado Department of Public Health and Environment, Water Quality Control Division, Non-Point Source Program (NPS), conducted high and low flow sampling events concentrated in the upper Howard Fork Basin, in June, 1994 and November of 1993, respectively. DMG collected aqueous samples which were analyzed for total and dissolved cadmium, copper, iron, lead, manganese and zinc at nineteen locations along the Howard Fork, its tributaries, as well as at eleven mine adits, including the Carbonero Mine and the two draining adits along the Carbonero access road. Various mine tailings, including the Carbonero mill tailings, were bracketed by the sampling site locations.

Results from the June, 1994 NPS sampling of the Howard Fork below the Carbonero Mine drainage indicate elevated concentrations (i.e., concentrations 3x greater than the sample upstream of the probable point of entry (PPE)) of total and dissolved cadmium, total iron, total manganese and total and dissolved zinc. Lead was measured above detection below the Carbonero Mine drainage PPE into the Howard Fork, whereas it was not detected at the sampling location upstream of the PPE. Low-flow analyses indicated that the Howard Fork below the PPE of the Carbonero Mine drainage was similar in concentrations to the immediate upstream sampling location for all metals analyzed. Metals concentrations in the Howard Fork downstream of the Carbonero tailings did not show any significant difference from the upstream sample location except for total lead during low flow analyses. A copy of the results are included in Appendix 7.

Comparison to the Superfund Chemical Data Matrix (SCDM) indicates that during low-flow, aquatic life benchmark concentrations were exceeded for: copper at all stations; zinc below the Carbonero drainage PPE; cadmium, lead and zinc below the Carbonero tailings PPE into the Howard Fork, as well as iron (seemingly from the iron spring draining adits). High flow analyses indicated that SCDMs freshwater aquatic life benchmarks were exceeded for: zinc at all stations; copper below the Carbonero PPE; and cadmium below the Carbonero tailings PPE (seemingly from the Iron Springs adits) (EPA, 1994).

The sources are not contained with respect to the ground water migration pathway. The town of Ophir is located approximately .6 miles downstream of the PPE of the Carbonero Mine drainage into the Howard Fork, and approximately .3 miles downstream of the Carbonero tailings pile. The 75 residents of Ophir obtain their drinking water from a natural groundwater spring north of town (CDPHE, WQCD, 1996). Water quality data of this drinking water source, maintained by the CDPHE Water Quality Control Division - Drinking Water Section, is provided in Appendix 7. Arsenic, barium, cadmium, chromium, fluoride, lead, mercury, selenium, silver and sodium were sampled in 1985, 1990, 1991, 1993 and 1994; antimony, beryllium, cyanide, nickel, sulfate, and thallium were sampled beginning in 1993 and again in 1994. Lead and copper from the tap were sampled in 1993, 1994, and 1995. In no instance did the concentration of

any of the inorganic parameters measured exceed Maximum Contamination Levels (mcls). VOCs were sampled in 1991, and both regulated and unregulated Phase I/II/V Organics were sampled in 1995; none of these compounds were detected.

One family served by a well resides approximately 2 miles below the Carbonero site (GW-1). Their well was considered the "background" well, sampled as part of the Silver Bell Site Investigation, in October, 1994 (CDPHE, 1994). A residential subdivision in Ames, Colorado is located approximately 4 miles downstream of the Carbonero site. The subdivision has two wells which withdraw water from the alluvial aquifer associated with the Lake Fork and Howard Fork. The wells are located approximately 100 yards upstream from the confluence of the Lake Fork and Howard Fork. The wells are reportedly 35 (shallow well GW-3) and 80 (deep well, GW-2) feet deep and were drilled in 1988. These wells serve a total 14 homes, or approximately 29 residents. Ground water well sampling results from the Silver Bell Site Investigation water samples are presented in Appendix 7.

The same two wells used for drinking water by the 29 residents of the Lake Fork Subdivision were sampled by the Homeowners Association in February of 1994. Those results indicate that manganese, sulfate, hardness and total dissolved solids exceeded drinking water standards. These results are also presented in Appendix 7.

The summary below compares parameters found in the wells GW-2 and GW-3 compared to the "background" well, GW-1. The parameters denoted in bold print below reflect the concentrations of parameters which are elevated above background concentrations.

<u>Parameter</u>	<u>GW-1 background (ug/l)</u>	<u>GW-2 Lake Fork deep well (ug/l)</u>	<u>GW-3 Lake Fork shallow well (ug/l)</u>
Iron	92.3 J	1940	93.4 J
Chromium	2.5 U	2.5 U	2.9 J
Lead	1.2 U	2.5 J	1.2 U
Manganese	3.0 J	243	221
Silver	1.6 U	1.6 U	1.9 J
Sodium	3630 J	7550 J	23100 J

Results from the Silver Bell Site Investigation indicated that iron concentrations in the Lake Fork deep well (GW-2) were three times the concentration of the background well, whereas the Lake Fork shallow well (GW-3) iron concentrations were similar to that of the background well. The concentration of iron is elevated in the deep well compared to iron concentrations measured in the two alluvial wells, possibly indicating that the deep well is drawing water from a different aquifer. However, manganese concentrations are similar in both the shallow and deep Lake Fork wells, both measuring three times higher than background concentrations, indicating an observed release.

Manganese concentrations in the "background" well were below the drinking water benchmark developed by EPA for use as screening concentrations (180 ug/l) (EPA, SCDM, 1994), whereas the downgradient wells were above the drinking water benchmark. This confirms significant concentrations of manganese reported in these wells in February, 1994 (Appendix 7). Chromium, lead, and silver in the downgradient wells were identified as observed releases as their concentrations were measured above the detection level of the background sample. However, the chromium concentration measured was lower than the corresponding drinking water benchmark. Sodium was identified as an observed release in the shallow Lake Fork well. There are no drinking water benchmarks established for iron, lead, silver and sodium.

Source of information:

G-8. Is there any other local, state, or federal regulatory involvement? Describe. Include permits, and names of contact individuals within each government organization.
NO

AGENCY	PROGRAM	CONTACT	PHONE	PERMIT

PA Worksheet
version August 1993

G-9. Attach site sketch or schematic. Include all pertinent features including wells, storage areas, underground storage tanks, source areas

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version August 1993

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CDPHE 000719

SOURCE CHARACTERIZATION

WC-1. Describe each source at the site, on Table 1, in terms of source type, containment, size/area/volume/quantity, and substances present. See HRS Tables 2-5 and 5-2 for source descriptions, Tables 3-2, 4-2, 4-8, 5-6, 6-3, and 6-9 for containment.

OK

WC-2. Briefly describe how waste quantity was estimated (eg. historical records or manifests, permit applications, air photo measurements, etc.):

Site visit: paced perimeter of piles, estimated depth and calculated volumes.

Source of information:

WC-3. Describe any restrictions or barriers to accessibility of onsite sources.

None.

Source of information:

GROUND WATER CHARACTERISTICS

GW-1. Any positive or circumstantial evidence of a release to ground water? Describe.

Tailings are located in a wetland. It would appear that any leaching through the tailings would drain directly into the groundwater table, which is at the ground surface.

Source of information:

GW-2. Any positive or circumstantial evidence of a release to drinking water users? Describe analytes, detection limits, background, hits, number of users, locations, QA/QC.

No.

Source of information:

GW-3. Briefly describe the geologic setting.

The Ophir stock is a massive igneous formation and is the prominent geologic feature in the area. The Ophir stock is a granite-like rock which contains feldspar, quartz, hornblende, and mica. This stock is overlain by sedimentary and volcanic rocks, which were uplifted, tipped, and formed the Ophir Needles.

In this area the Morrison Formation has Brushy Basin Shale, a variegated red and green claystone and siltstone, a red thin blocky sandstone, a few conglomerate beds, and rare, thin limestone beds. It includes a thin top layer equivalent of the Burro Canyon Formation.

The Carbonero Mine is located on the north side of the Howard Fork valley across from Grants Peak. The mine drainage emanating from Shoo-fly level of the Carbonero Mine travels a distance of approximately one mile before it enters the Howard Fork. An iron bog is located along the northern bank of the Howard Fork, upstream of its confluence with the Carbonero Mine drainage. A tailings pile is located along the northern bank of the Howard Fork, approximately a third of a mile downstream from where the Carbonero Mine drainage enters the river.

Most of the veins on the north side of the valley of the Howard Fork trend within 10° of N. 65° E., or approximately east. The vein farthest north, the Carbonero vein, strikes between N. 50° E. and N. 85° E., averaging N. 75° E.; the average dip is 80° N. The vein is as much as 36 inches wide, averaging 12 inches, and consists of one to four stringers of sulfides in gangue or altered country rock. The sulfides, in the order of decreasing abundance, are pyrite, galena, sphalerite and chalcopryite; the nonmetallic minerals are gypsum, quartz, calcite and, rarely, rhodochrosite. The next vein south, the Panama, has an average strike of about N. 55° E., and a steep dip to either the northwest or southeast. The Panama vein is considerably narrower than the Carbonero, being only 1 to 6 inches wide but consists of almost solid sulfides (sphalerite, galena, pyrite, and chalcopryite, in order of abundance) with a sparse gangue of quartz and gypsum. Not much can be seen of the third vein in the Carbonero Mine, that at the portal, but a fault breccia cemented by limonite and containing some quartz and galena (U.S.G.S., 1959).

Landslides are common along the Illium Valley due to unstable volcanic rocks which often contain thick layers of poorly consolidated volcanic ash, the underlying and unstable Mancos Shale, valley walls over-steepened by glacial activity, and saturation of soil and underlying rocks from mountain storms and heavy snows, adding weight and reducing friction.

Three soil types are present in the area, including Cryorthents, Skisams-Cryoborolls, and the Quander family. The Cryorthents soils are a rubble land complex, generally found on mountain side slopes. They are shallow to deep, well drained, and derived from mixed sources. Skisams-Cryoborolls is a moderately deep complex found on

benches and side slopes. It is shallow, well drained, and formed from limestone or sandstone derivatives. The Quander family soils are a Varden complex on mountain sides and alluvial fans. The soil is deep and well drained. It is an alluvium formed from rhyolite, tuff, and similar volcanic rocks. The water-holding capacity is moderate and the hazard of water erosion is moderate to high (Morrison Knudsen, 1994).

GW-4. Describe geologic/hydrogeologic units on Table 2. Give names, descriptions, and characteristics of consolidated and unconsolidated zones beneath the site.

GW-5. Is the site in an area of karst terrain or a karst aquifer?
No.

GW-6. Net Precipitation (per HRS section 3.1.2.2).

Mean Annual Precipitation = 16 inches
Annual Lake Evaporation = 36 inches

SURFACE WATER CHARACTERISTICS

SW-1. Mean annual precipitation (per HRS section 4.0.2) = 16 inches. If less than 20", then count intermittent channels as surface water.

SW-2. Discuss the probable surface water flow pattern from the site to surface waters:

The sources are not contained with respect to the surface water pathway. Drainage from the mine flows along, thereby eroding the toe of the adjacent waste rock pile, then directly into the Howard Fork. The Howard Fork then flows immediately south of the tailings pile. Erosion channels were observed on the surface and sides of the tailings pile. A perennial drainage from the wetland north of the pile were observed flowing over the tailings pile surface, transporting tailings directly into the Howard Fork (Appendix 5).

Source of information:

SW-3. If surface water exists within 2 miles of the site, describe surface water segments within the 15-mile distance limit.

Segment Name	River/Lake /type	Fresh/Salt Water	Start (mi.)	End (mi.)	flow in cfs
Howard Fork	River	fresh	1	3	
South Fork	River	fresh	3	11	
San Miguel River	River	fresh	11	15	

Ground water to surface distance 0 ft. Angle 0

SW-4. Provide a schematic diagram or simple figure which describes surface water segments, locates targets, identifies flow direction, PPE(s), etc. Refer to figure(s) submitted with text of report if appropriate.

SW-5. Any positive or circumstantial evidence of a release to surface water? Evidence of a release by direct observation? Is the source located in surface water? Describe.

The sources are not contained with respect to the surface water pathway. Drainage from the mine flows along, thereby eroding the toe of the adjacent waste rock pile, then directly into the Howard Fork. The Howard Fork then flows immediately south of the tailings pile. Erosion channels were observed on the surface and sides of the tailings pile. A perennial drainage from the wetland north of the pile were observed flowing over the tailings pile surface, transporting tailings directly into the Howard Fork (Appendix 5).

The San Miguel River corridor is one of the few unobstructed riverine systems left in the West, and many conservation agencies are trying to preserve its "natural" condition. Nine vegetative communities have been identified within the riparian zone along the San Miguel River. There are wetlands located intermittently along the San Miguel River corridor in the 15-mile downstream segment below the site.

The Carbonero Mine does not have a permit from the Water Quality Control Division of CDPHE to discharge into the Howard Fork (CDPHE, WQCD, 1996).

The 15-mile target distance limit follows the Howard Fork, then along the South Fork, then along the San Miguel River to a location approximately 1 mile east of Sawpit, Colorado (Figure 4). Both the San Miguel River and South Fork are fisheries. Sensitive environments within this segment include bald eagle and the river otter habitats, the San Miguel River Preserve (a Nature Conservancy property), and segments of the San Miguel State Wildlife Area. In addition, there are numerous campsites along the South Fork on National Forest property. Although not considered a sensitive environment, the active hydropower plant at Ames is designated as a historic site. Willows and riparian habitats were observed immediately north and west of the tailings pile, and along the South Fork.

The Colorado Division of Minerals and Geology (DMG), in cooperation with the Colorado Department of Public Health and Environment, Water Quality Control Division, Non-Point Source Program (NPS), conducted high and low flow sampling events concentrated in the upper Howard Fork Basin, in June, 1994 and November of 1993, respectively. DMG collected aqueous samples which were analyzed for total and dissolved cadmium, copper, iron, lead, manganese and zinc at nineteen locations along the Howard Fork, its tributaries, as well as at eleven mine adits, including the Carbonero Mine and the two draining adits along the Carbonero access road. Various mine tailings, including the Carbonero mill tailings, were bracketed by the sampling site locations.

Results from the June, 1994 NPS sampling of the Howard Fork below the Carbonero Mine drainage indicate elevated concentrations (i.e., concentrations 3x greater than the sample upstream of the probable point of entry (PPE)) of total and dissolved cadmium, total iron, total manganese and total and dissolved zinc. Lead was measured above detection below the Carbonero Mine drainage PPE into the Howard Fork, whereas it was not detected at the sampling location upstream of the PPE. Low-flow analyses indicated that the Howard Fork below the PPE of the Carbonero Mine drainage was similar in concentrations to the immediate upstream sampling location for all metals analyzed. Metals concentrations in the Howard Fork downstream of the Carbonero tailings did not show any significant difference from the upstream sample location except for total lead during low flow analyses. A copy of the results are included in Appendix 7.

Comparison to the Superfund Chemical Data Matrix (SCDM) indicates that during low-flow, aquatic life benchmark concentrations were exceeded for: copper at all stations; zinc below the Carbonero drainage PPE; cadmium, lead and zinc below the Carbonero tailings PPE into the Howard Fork, as well as iron (seemingly from the iron spring draining adits). High flow analyses indicated that SCDMs freshwater aquatic life benchmarks were exceeded for: zinc at all stations; copper below the Carbonero PPE; and cadmium below the Carbonero tailings PPE (seemingly from the Iron Springs adits) (EPA, 1994).

Source of information:

PA Worksheet
version August 1993

SW-6. Any positive or circumstantial evidence of a release to surface water target populations? Describe analytes, detection limits, background, hits, number of users, locations, QA/QC.

no

Source of information:

SW-8. Is the site or portions thereof located in surface water?

Is the site located in the 1 - <10 yr floodplain? yes, the tailings site

>10-100 yr?

>100-500 yr?

>500 yr?

SW-9. Two-year 24-hour rainfall 2 inches

TARGETS

T-1. Discuss ground water usage within four mile of the site:

The sources are not contained with respect to the ground water migration pathway. The town of Ophir is located approximately .6 miles downstream of the PPE of the Carbonero Mine drainage into the Howard Fork, and approximately .3 miles downstream of the Carbonero tailings pile. The 75 residents of Ophir obtain their drinking water from a natural groundwater spring north of town (CDPHE, WOCD, 1996). Water quality data of this drinking water source, maintained by the CDPHE Water Quality Control Division - Drinking Water Section, is provided in Appendix 7. Arsenic, barium, cadmium, chromium, fluoride, lead, mercury, selenium, silver and sodium were sampled in 1985, 1990, 1991, 1993 and 1994; antimony, beryllium, cyanide, nickel, sulfate, and thallium were sampled beginning in 1993 and again in 1994. Lead and copper from the tap were sampled in 1993, 1994, and 1995. In no instance did the concentration of any of the inorganic parameters measured exceed Maximum Contamination Levels (mcls). VOCs were sampled in 1991, and both regulated and unregulated Phase I/II/V Organics were sampled in 1995; none of these compounds were detected.

One family served by a well resides approximately 2 miles below the Carbonero site (GW-1). Their well was considered the "background" well, sampled as part of the Silver Bell Site Investigation, in October, 1994 (CDPHE, 1994). A residential subdivision in Ames, Colorado is located approximately 4 miles downstream of the Carbonero site. The subdivision has two wells which withdraw water from the alluvial aquifer associated with the Lake Fork and Howard Fork. The wells are located approximately 100 yards upstream from the confluence of the Lake Fork and Howard Fork. The wells are reportedly 35 (shallow well GW-3) and 80 (deep well, GW-2) feet deep and were drilled in 1988. These wells serve a total 14 homes, or approximately 29 residents. Ground water well sampling results from the Silver Bell Site Investigation water samples are presented in Appendix 7.

The same two wells used for drinking water by the 29 residents of the Lake Fork Subdivision were sampled by the Homeowners Association in February of 1994. Those results indicate that manganese, sulfate, hardness and total dissolved solids exceeded drinking water standards. These results are also presented in Appendix 7.

The summary below compares parameters found in the wells GW-2 and GW-3 compared to the "background" well, GW-1. The parameters denoted in **bold print** below reflect the concentrations of parameters which are elevated above background concentrations.

	GW-1 background	GW-2 Lake Fork deep well	GW-3 Lake Fork shallow well
<u>Parameter</u>	<u>(ug/l)</u>	<u>(ug/l)</u>	<u>(ug/l)</u>
Iron	92.3 J	1940	93.4 J
Chromium	2.5 U	2.5 U	2.9 J
Lead	1.2 U	2.5 J	1.2 U
Manganese	3.0 J	243	221
Silver	1.6 U	1.6 U	1.9 J
Sodium	3630 J	7550 J	23100 J

Results from the Silver Bell Site Investigation indicated that iron concentrations in the Lake Fork deep well (GW-2) were three times the concentration of the background well, whereas the Lake Fork shallow well (GW-3) iron concentrations were similar to that of the background well. The concentration of iron is elevated in the deep well compared to iron concentrations measured in the two alluvial wells, possibly indicating that the deep well is drawing water from a different aquifer. However, manganese concentrations are similar in both the shallow and

deep Lake Fork wells, both measuring three times higher than background concentrations, indicating an observed release.

Manganese concentrations in the "background" well were below the drinking water benchmark developed by EPA for use as screening concentrations (180 ug/l) (EPA, SCDM, 1994), whereas the downgradient wells were above the drinking water benchmark. This confirms significant concentrations of manganese reported in these wells in February, 1994 (Appendix 7). Chromium, lead, and silver in the downgradient wells were identified as observed releases as their concentrations were measured above the detection level of the background sample. However, the chromium concentration measured was lower than the corresponding drinking water benchmark. Sodium was identified as an observed release in the shallow Lake Fork well. There are no drinking water benchmarks established for iron, lead, silver and sodium.

Given the lack of any groundwater containment system at the site, the disposal methods used at the site, and the proximity of the water-bearing alluvium of the Howard Fork, contaminants could migrate into groundwater at this site.

Source of information:

T-2. Summarize the drinking water population served via Ground Water within 4 miles of the site:

Ground water use within the 4-mile target distance limit was estimated as follows from well logs and 1990 Census Bureau data for people/household in San Miguel County:

<u>Distance from Site (miles)</u>	<u>Number of People Served</u>
0 - ¼	0
¼ - ½	0
½ - 1	75
1 - 2	4
2 - 3	4
3 - 4	29

Attach calculations for population apportionment in blended systems.

T-3. Identify and locate any of the following surface water targets within 15 miles of the site: drinking water population(s) served by intakes, fisheries, sensitive environments described in Table 4-23 of the HRS, and wetlands as defined in the Federal Register.

Targets	dist. from site	SW body	flow in cfs	population served/size (incl. units)	contamination known/suspected
Fisheries	3 miles	South Fork			heavy metals
Fisheries	11 miles	San Miguel River			heavy metals
Wetlands	1-15 miles	Howard Fork, South fork and San Miguel Rivers			heavy metals

T-4. Summarize the population within a four-mile radius of the site:

	<u>Total Pop.</u>	<u>worker pop.</u>
onsite	<u>0</u>	<u>0</u>
0 - 1/4 mi	<u>0</u>	
1/4 - 1/2 mi	<u>0</u>	
1/2 - 1 mi	<u>75</u>	
1 - 2 mi	<u>4</u>	
2 - 3 mi	<u>4</u>	
3 - 4 mi	<u>29</u>	

T-5. Identify and locate any terrestrial sensitive environments described in Table 5-5 of the HRS.

N/A

T-6. Describe any positive or circumstantial evidence of a release to air target populations? Of a release by direct observation where target population exists within 1/4 mile of the site? Describe analytes, detection limits, background, hits, number of users, locations, QA/QC.

N/A

T-7. Identify and locate any potential or known resident soil exposure populations, if present. Describe conditions which lead the researcher to suspect contaminated soil within 200' of residences, if this condition exists.

N/A

TABLE 1

WASTE CONTAINMENT AND HAZARDOUS SUBSTANCE IDENTIFICATION¹

SOURCE TYPE	SIZE (Volume/Area)	ESTIMATED WASTE QUANTITY	SPECIFIC COMPOUNDS	CONTAINMENT ²	SOURCES OF INFORMATION
Shoofly adit		300 gallons per minute	heavy metals	None	Site Visit
Shoofly waste rock pile	500 sq. ft.; 27,500 cu. yds.	pacing/volume calculations	heavy metals	None	Site Visit
Carbonero Tailings	1.75 acres; 15,555 cu. yds.	pacing/ volume calculations	heavy metals	None	Site Visit

¹ Use additional sheets if necessary

² Evaluate containment of each source from the perspective of each migration pathway (e.g., ground water pathway - non-existent, natural or synthetic liner, corroding underground storage tank; surface water - inadequate freeboard, corroding bulk tanks; air - unstabilized slag piles, leaking drums, etc.)

TABLE 2
HYDROGEOLOGIC INFORMATION¹

STRATA NAME/DESCRIPTION	THICKNESS (ft.)	HYDRAULIC CONDUCTIVITY (cm/sec)	TYPE OF DISCONTINUITY²	SOURCE OF INFORMATION
Alluvium	60 ft.	unknown	surrounding mountain uplifts	MK, 1994
Morrison formation	0-500 ft.	unknown	surrounding mountain uplifts	MK, 1994

¹ Use additional sheets if necessary

² Identify the type of aquifer discontinuity within four miles from the site (e.g., river, strata "pinches out," etc.)

APPENDIX 4

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2

CDPHE 000731

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: Carbonero Mine CERCLIS #: _____

AKA: _____ SSID: _____

ADDRESS: _____

CITY: Ophir STATE: Colorado ZIP CODE: 81426

SITE REFERENCE POINT: Carbonero Mine Drainage PPE into Howards Fork

USGS QUAD MAP NAME: Ophir Quadrangle TOWNSHIP: 42 N RANGE: 9 E

SCALE: 1:24,000 MAP DATE: 1955 SECTION: SE 1/4 NE 1/4 SW 1/4 36

MAP DATUM: (1927) 1983 (CIRCLE ONE) MERIDIAN: New Mexican

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 107° 45' ____ LATITUDE: 37° 45' ____

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 107° 47' 30" LATITUDE: 37° 50' ____

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 210

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

$$A \times 0.3304 = 69.38$$

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 1° 9' 38"

D) ADD TO STARTING LATITUDE: 37° 45' ____ + 1° 9' 38" =

SITE LATITUDE: 37° 46' 9" 38"

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP) (2.5 min = 350 ruler graduations)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 145

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

$$A \times 0.3304 = 62.15$$

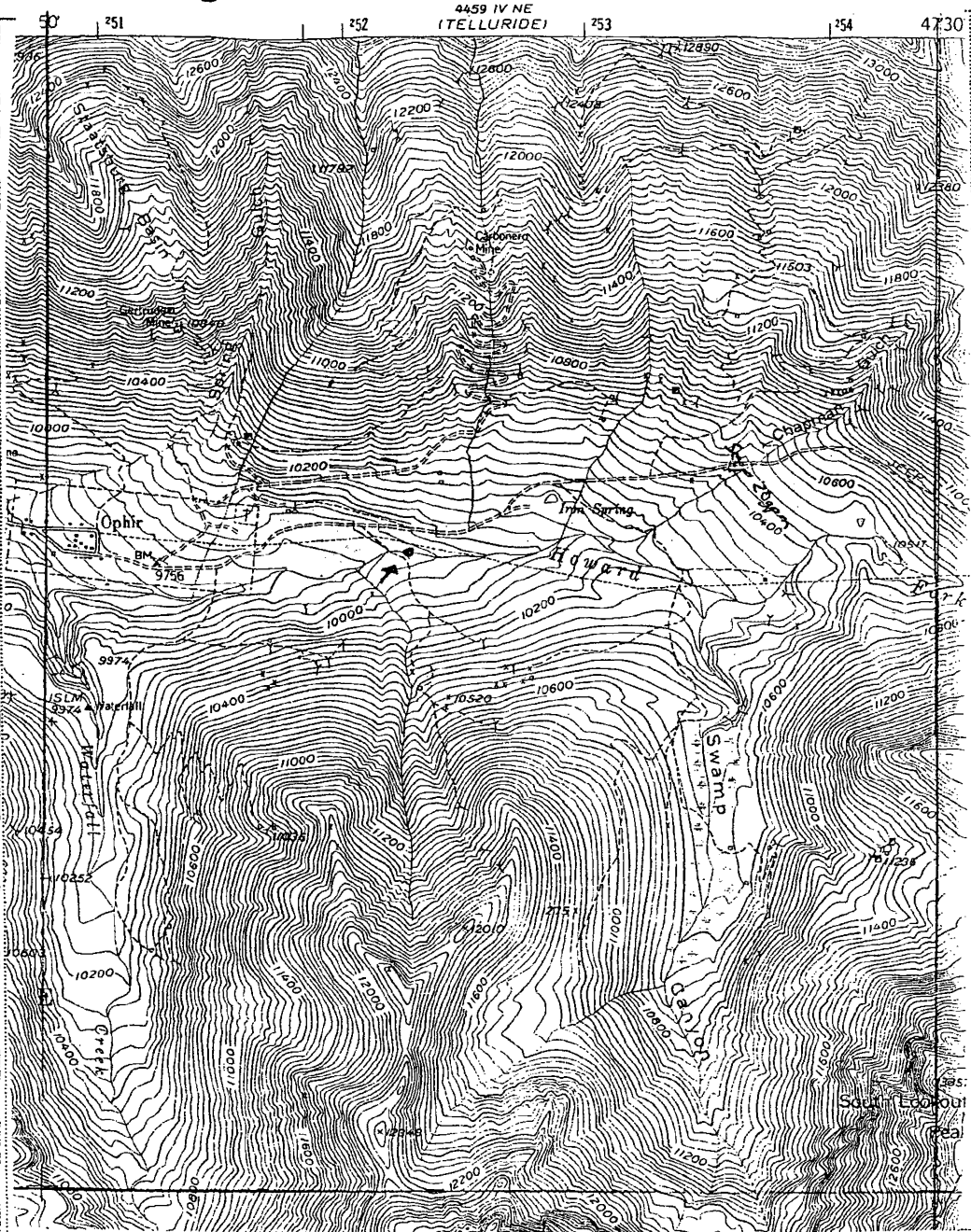
C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 1° 2' 15"

D) ADD TO STARTING LONGITUDE: 107° 47' 30" + 1° 2' 15" =

SITE LONGITUDE: 107° 48' 32" 15"

INVESTIGATOR: Camille Farrell DATE: 10/18/96

SITE NAME: Carbonero Mine NUMBER: _____



TOPOGRAPHIC MAP QUADRANGLE NAME: Ophir Quadrangle SCALE: 1:24,000
 COORDINATES OF LOWER RIGHT-HAND CORNER OF 2.5-MINUTE GRID:
 LATITUDE: 47° 30' LONGITUDE: 37° 50'

APPENDIX 5
SITE PHOTOGRAPHS

CDPHE 000734

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Carbonero Mine drainage flowing into the Howard Fork.

Date: September 25, 1998 Time: 1230

Direction facing: East (35mm film)

Description of Photo: Carbonero Mine drainage flowing into the Howard Fork.

Date: September 25, 1998 Time: 1230

Direction facing: Southwest (35mm film)

CDPHE 000735

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Shallow level of the Carbonero Mine; mine drainage flowing toward the Howard Fork.

Date: September 25, 1998 Time: 1230

Direction facing: North (35mm film)



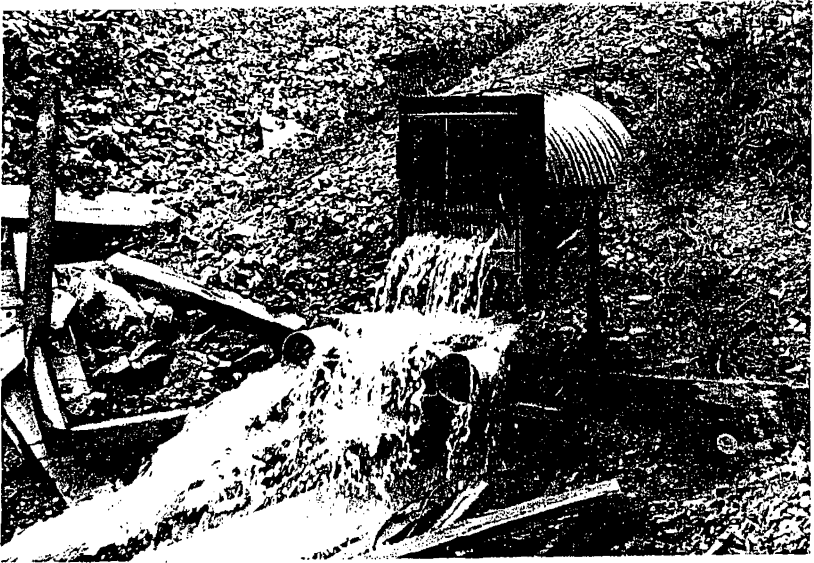
Description of Photo: Carbonero Mine drainage flowing toward the Howard Fork.

Date: September 25, 1998 Time: 1230

Direction facing: Northeast (35mm film)

CDPHE 000736

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Draining adit at the Shoolfly level of the Carbonero Mine.
Date: September 25, 1998 Time: 1330
Direction facing: East (35mm film)

Description of Photo: Draining adit at the Shoolfly level of the Carbonero Mine.
Date: September 25, 1998 Time: 1330
Direction facing: East (35mm film)

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Draining edit at the Shootly level of the Carbonero Mine.

Date: September 25, 1998 Time: 1330

Direction facing: East (35mm film)



Description of Photo: Draining edit flowing along toe of waste rock pile at the Shootly level of the Carbonero.

Date: September 25, 1998 Time: 1330

Direction facing: West (35mm film)

CDPHE 000738

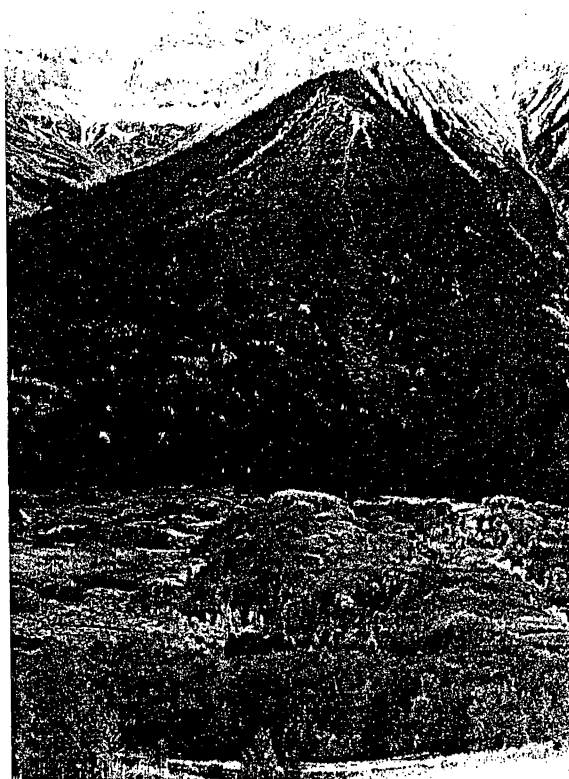
OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Carbonero Mine drainage into the Howard Fork.

Date: September 25, 1996 Time: 1330

Direction facing: South (35mm film)



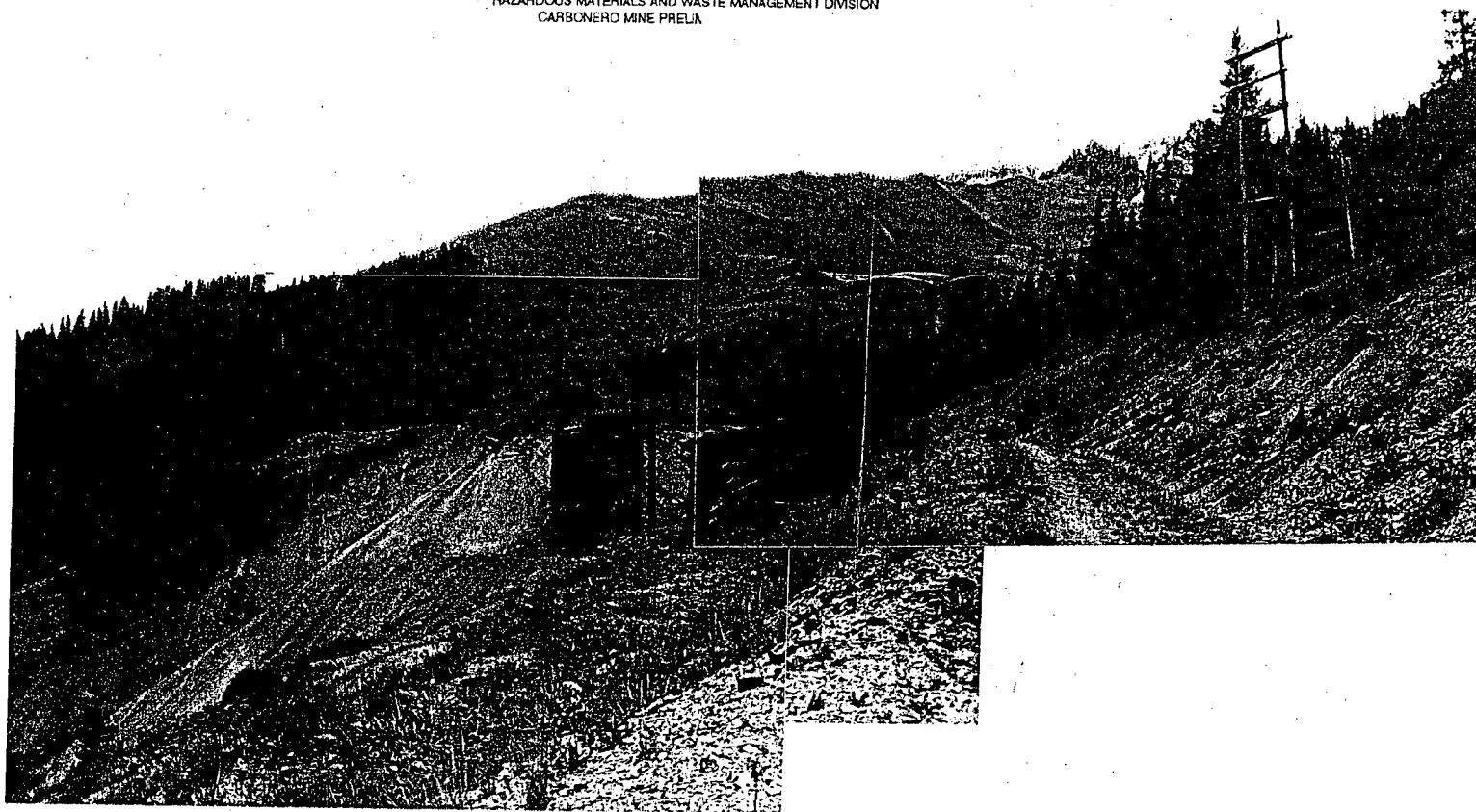
Description of Photo: Iron bog upstream of the Carbonero Mine drainage flowing into the Howard Fork.

Date: September 25, 1996 Time: 1330

Direction facing: South (35mm film)

CDPHE 000739

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIM



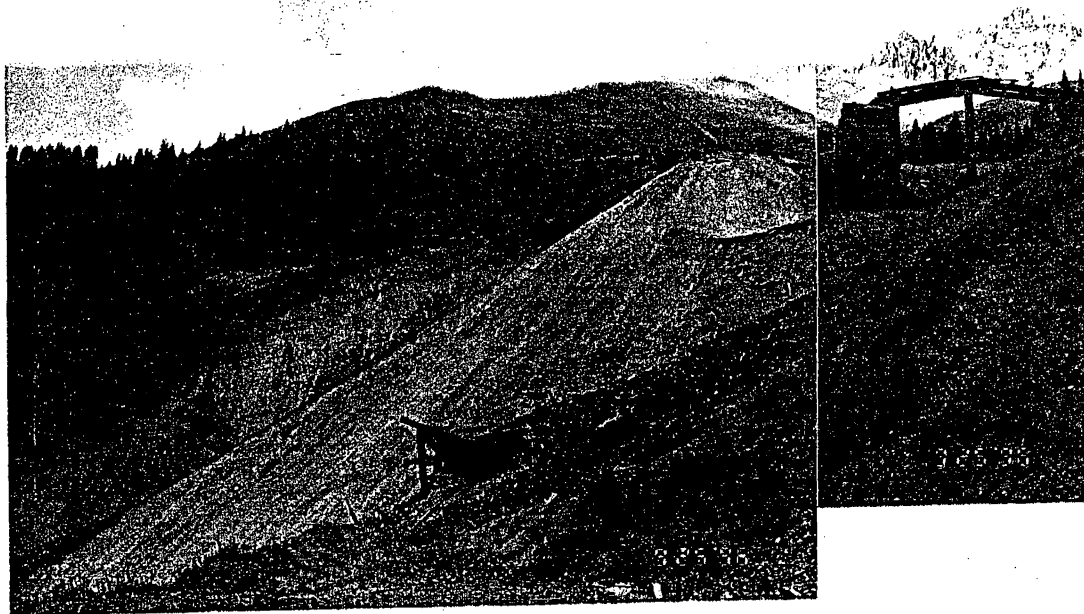
Description of Photo: Shoo fly level of the Carbonero Mine; ore bin/loadout and waste rock pile.

Date: September 25, 1998 Time: 1400

Direction facing: Northwest (35mm film)

CDPHE 000740

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
CARBONERO MINE PRELIMINARY ASSESSMENT



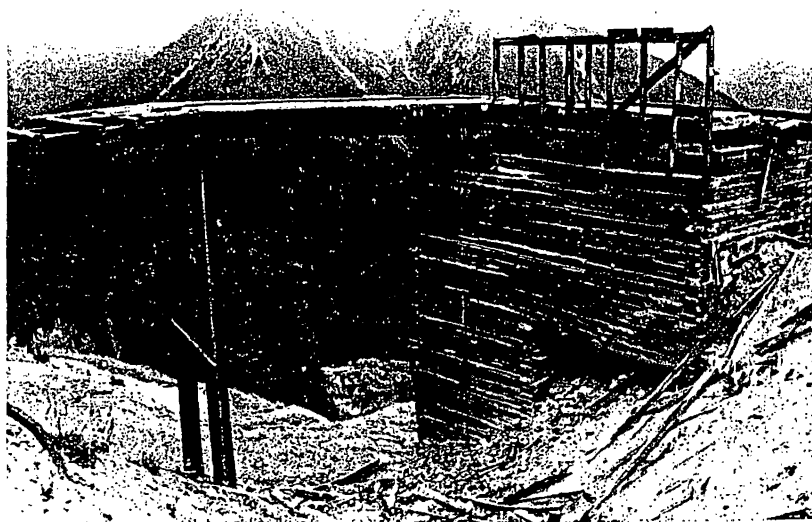
Description of Photo: Shoofty level of the Carbonero Mine; ore bin/loadout and waste rock pile.

Date: September 25, 1996 Time: 1400

Direction facing: Northwest (35mm film)

CDPHE 000741

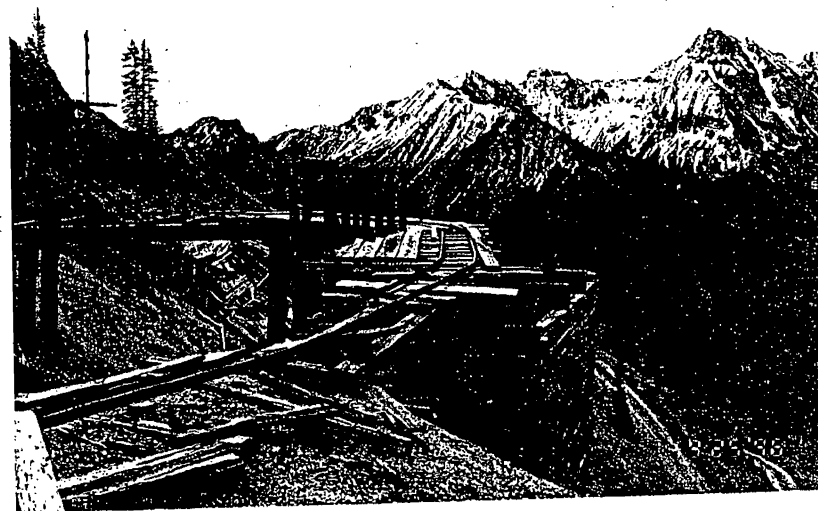
OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Carbonero Mine ore bin/loadout structure.

Date: September 25, 1998 Time: 1400

Direction facing: Southwest (35mm film)



Description of Photo: Carbonero Mine ore bin/loadout structure.

Date: September 25, 1998 Time: 1400

Direction facing: SE (35mm film)

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: "Dry" waste rock pile above iron-spring on road ascending to the Carbonero Mine.

Date: September 25, 1998 Time: 1420

Direction facing: Southwest (35mm film)

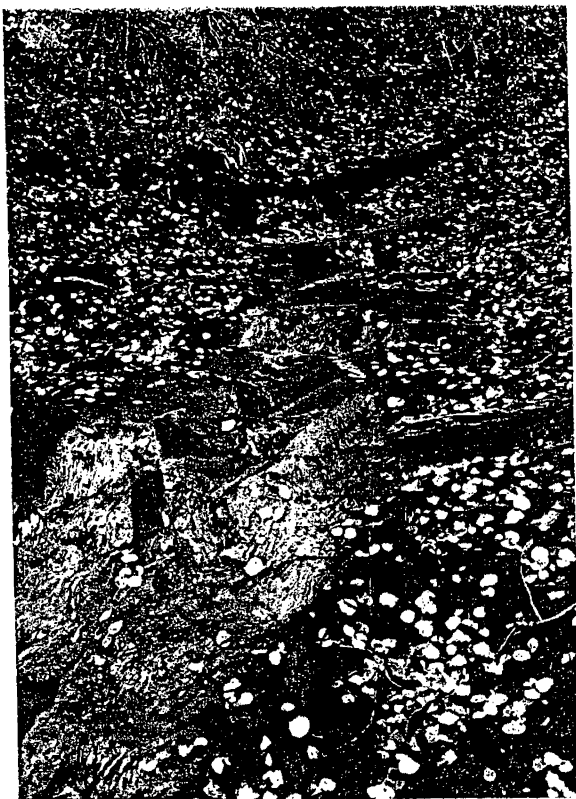
Description of Photo: "Dry" waste rock pile above iron-spring on the road ascending to the Carbonero Mine.

Date: September 25, 1998 Time: 1420

Direction facing: North (35mm film)

CDPHE 000743

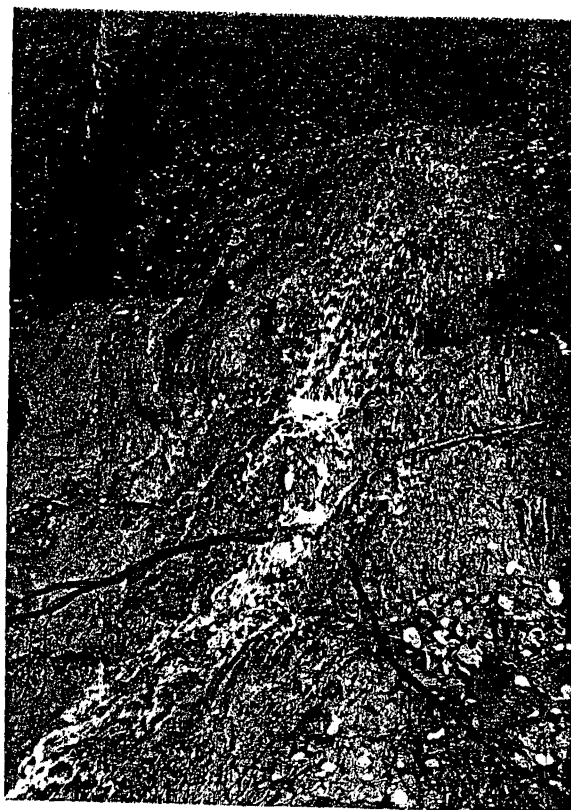
OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Iron-spring (shaft?) on road ascending to the Carbonero Mine.

Date: September 25, 1998 Time: 1420

Direction facing: North (35mm film)



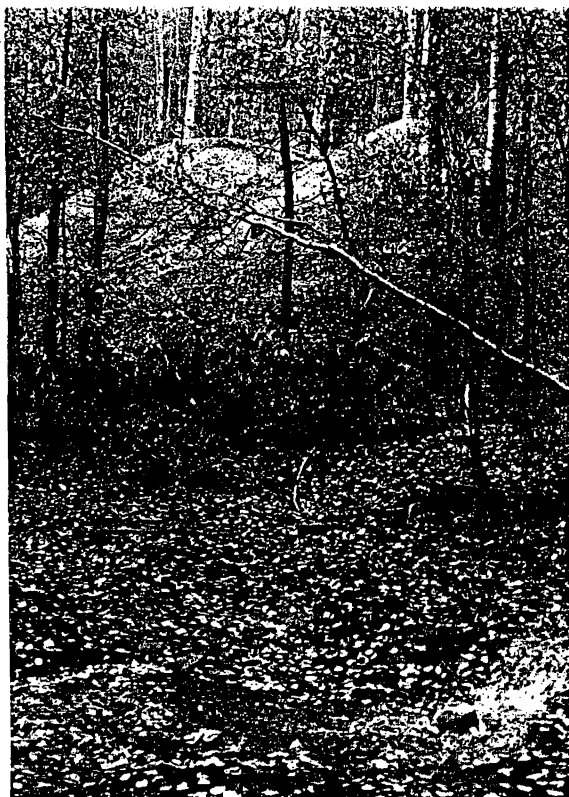
Description of Photo: Iron-spring (shaft?) on the road ascending to the Carbonero Mine.

Date: September 25, 1998 Time: 1420

Direction facing: North (35mm film)

CDPHE 000744

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Draining mine on road ascending to the Carbonero Mine.

Date: September 25, 1990 Time: 1430

Direction facing: Northwest (35mm film)



Description of Photo: Carbonero Mill tailings downstream of Carbonero mine drainage flowing into the Howard Fork.

Date: September 25, 1990 Time: 1330

Direction facing: Southwest (35mm film)

CDPHE 000745

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Carbonero mill tailings upstream of "East Ophir".

Date: September 25, 1990 Time: 1445

Direction facing: Southeast (35mm film)



Description of Photo: Carbonero mill tailings (note wetlands north and west of pile).

Date: September 25, 1990 Time: 1445

Direction facing: Southeast (35mm film)

CDPHE 000746

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Carbonero mill tailings (note wetlands and ponds west of pile).

Date: October 8, 1998 Time: 1200

Direction facing: Southeast (35mm film)



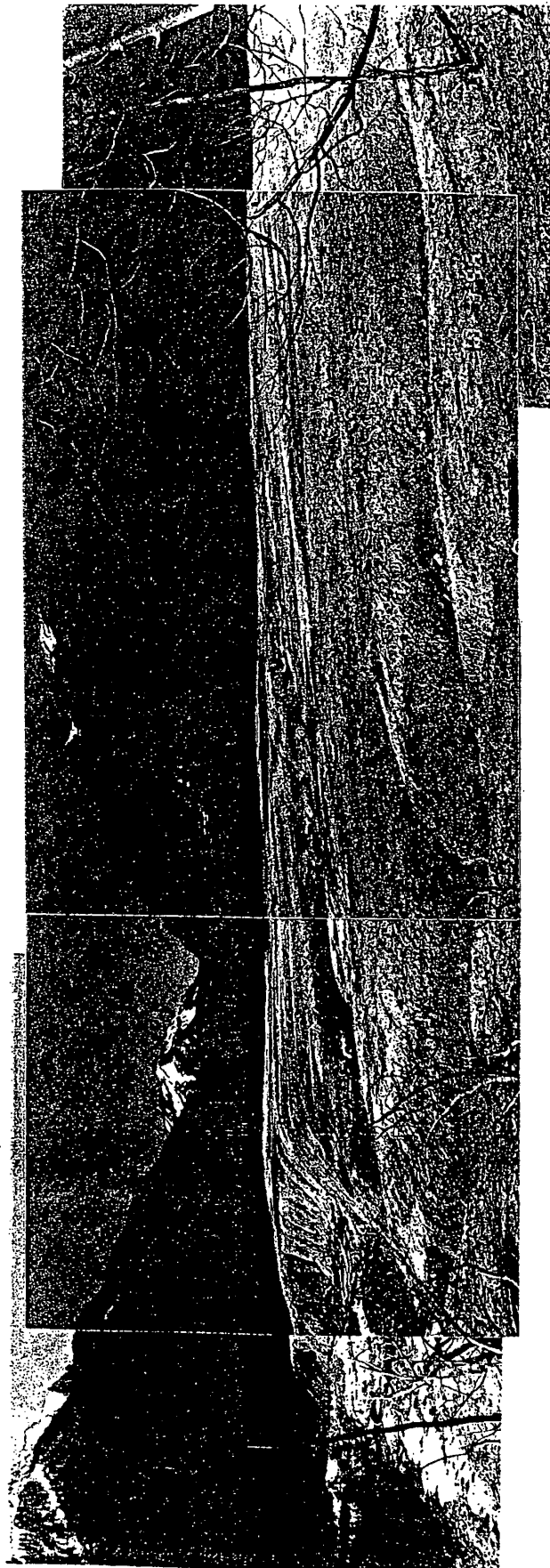
Description of Photo: Draining edit on "Ferric Oxide" placer.

Date: October 8, 1998 Time: 1200

Direction facing: Northwest (35mm film)

CDPHE 000747

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Carbonero Mill tailings (note erosion channels on surface)

Date: October 8, 1990 Time: 1200

Direction facing: Northwest (35mm film)

CDPHE 000748

OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Carbonero mill tailings (east end flume overflow/tailings spillage area).

Date: October 8, 1998 Time: 1200

Direction facing: West (35mm film)



Description of Photo: Flume overflow/tailings spillage area on east end of Carbonero mill tailings.

Date: October 8, 1998 Time: 1200

Direction facing: Northeast (35mm film)

CDPHE 000749

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
CARBONERO MINE PRELIMINARY ASSESSMENT



CDPHE 000750

Description of Photo: Wellheads draining onto Carbonero tailings.
Date: October 8, 1996 Time: 1200
Direction facing: South (35mm film)

Description of Photo: Entrained tailings resulting from wellheads draining over Carbonero tailings.
Date: October 8, 1996 Time: 1200
Direction facing: North (35mm film)

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Overland flow path atop Carbonero tailings.
Date: October 6, 1996 Time: 1200
Direction facing: South (35mm film)

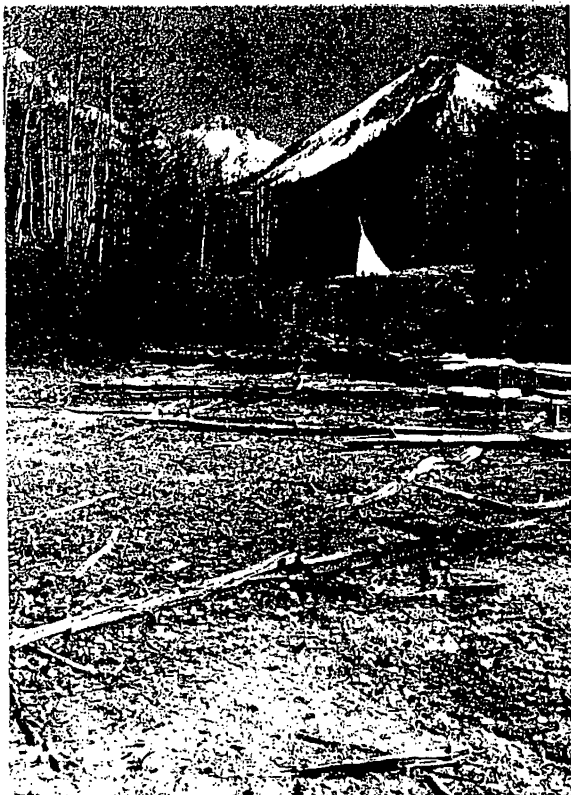


Description of Photo: PPE of Carbonero tailings into the Howard Fork.
Date: October 8, 1996 Time: 1200
Direction facing: North (35mm film)



CDPHE 000751

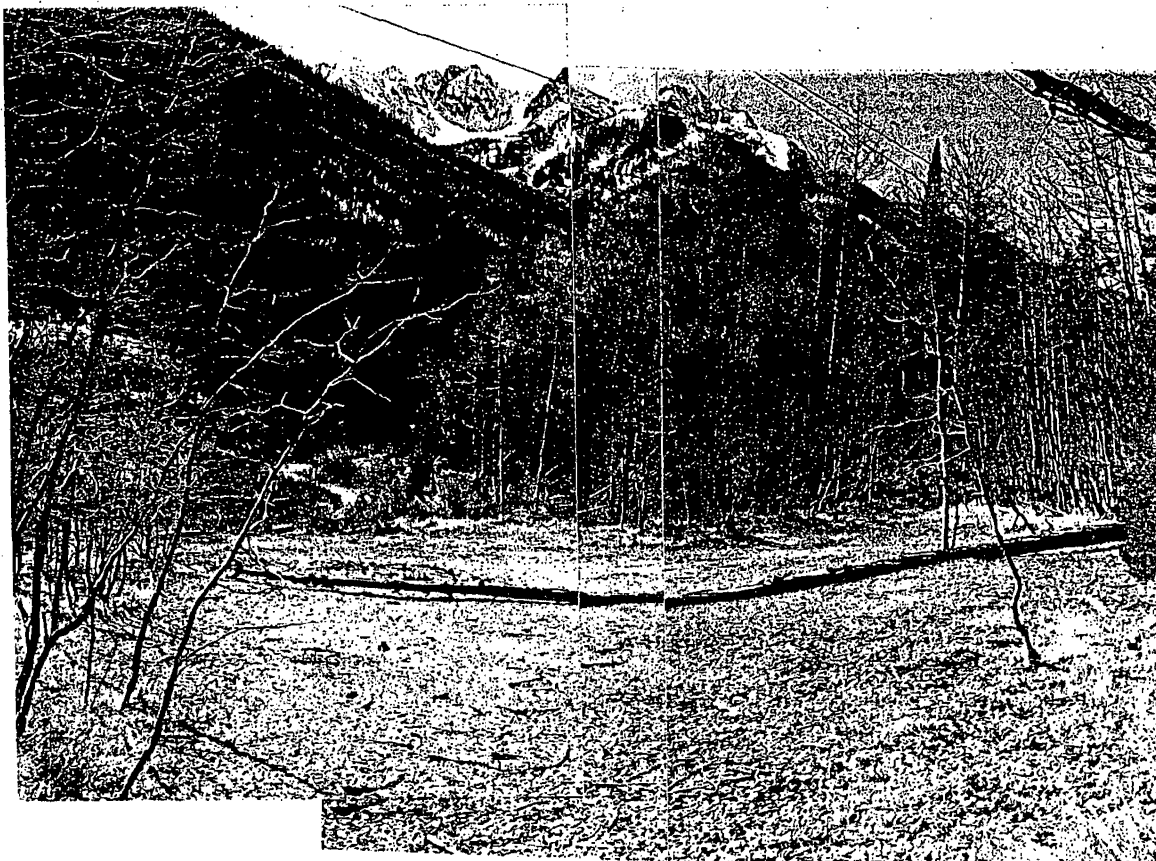
OFFICIAL PHOTOGRAPHS
 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
 HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
 CARBONERO MINE PRELIMINARY ASSESSMENT



Description of Photo: Tailings spillage along flume line 500' east of tailing pile.

Date: October 8, 1968 Time: 1230

Direction facing: Southeast (35mm film)



Description of Photo: Tailings spillage along flume line 600' east of the tailings pile.

Date: October 8, 1968 Time: 1230

Direction facing: Southeast (35mm film)

CDPHE 000752

APPENDIX 6
RECORD OF COMMUNICATION

CDPHE 000753

RECORD OF COMMUNICATION

PHONE CALL TO: April Montgomery, San Miguel County Planning Office
(O) (970) 728-4396

FROM: Camille M. Farrell

DATE: September 26, 1996

TIME: 3:55 p.m.

SUBJECT: Ophir/East Ophir Drinking Water Source

SUMMARY OF COMMUNICATION:

Ms. Montgomery related the following information:

Ophir utilizes an underground spring immediately north of the town for drinking water. The town has recently improved this system. The town formerly used a system in Waterfall Canyon, on the south side of the valley. The town will maintain the Waterfall water system as a backup.

Ms. Montgomery did not know if East Ophir is hooked into the Ophir water system, and suggested calling Nick Kennedy, East Ophir resident.

CDPHE 000754

RECORD OF COMMUNICATION

PHONE CALL TO: Bob Shukle, CDPHE, WQCD
(O) (303) 692-3500

FROM: Camille M. Farrell

DATE: September 27, 1996

TIME: 3:55 p.m.

SUBJECT: Carbonero CDPES Permit Status

SUMMARY OF COMMUNICATION:

Mr. Shukle related the following information:

The Carbonero mine is not listed as having a CDPES permit. Mr. Shukle remembers the Carbonero is an adit that "blows out" every few years.

CDPHE 000755

RECORD OF COMMUNICATION

PHONE CALL TO: Heather Holmes, CDPHE, WQCD
(O) (303) 692-3500

FROM: Camille M. Farrell

DATE: September 27, 1996

TIME: 1:55 p.m.

SUBJECT: Ophir Drinking Water Supply

SUMMARY OF COMMUNICATION:

Ms. Holmes related the following information:

Ophir has a natural ground water spring serving a population of 75 people. Ms. Holmes FAXED a "Water Quality Report" detailing well monitoring data, included in Appendix 8 of the Carbonero Mine Preliminary Assessment Report.

CDPHE 000756

APPENDIX 7
PREVIOUS INVESTIGATIONS

CDPHE 000757

DMG NPS Sampling High Flow - June 1994													
Concentrations in ug/L (ppb)													
Site	pH	Cd (T)	Cd (D)	Cu (T)	Cu (D)	Fe (T)	Fe (D)	Pb (T)	Pb (D)	Mn (T)	Mn (D)	Zn (T)	Zn (D)
5 above Carbonero	6.8	U .25	U .25	8	6	200	32	U <5	U <5	100	95	33	33
12 Carbonero drainage	6.0	20	19	280	130	11000	4100	85	U <5	5900	5900	4900	4900
6 below Carbonero	6.9	.96	1.1	13*	7	700	66	7	U <5	340	290	230*	220
16 adit below Carbonero above tailings	6.8	U .25	4.2	U <8	U <8	6900	7000	U <5	U <5	1300	1400	53	56
17 adit below Carbonero above tailings	6.2	4.3	.96	160	100	5600	2500	8	U <5	2600	2500	1000	1000
18 below tailings	6.6	1.1*	U .25	10	5	370	28	U <5	U <5	310	300	270*	240
SCDMS SW fish Bench- marks		1.1		12		1000		3.2		-		110	

Highlighted numbers indicate concentrations 3 times that of upstream measurements.

Concentrations annotated with (*) indicate concentrations exceeding SCDMS surface water fresh water aquatic life benchmark.

CDPHE 000758

DMG NPS Sampling Low Flow - November 1993												
Site	Cd (T)	Cd (D)	Cu (T)	Cu (D)	Fe (T)	Fe (D)	Pb (T)	Pb (D)	Mn (T)	Mn (D)	Zn (T)	Zn (D)
5 above Carbonero	.72	.68	29*	14	800	67	U <5	U <5	260	260	90	83
12 Carbonero drainage	5	5	23	U <4	3400	1200	11	U <5	2200	2200	1300	1100
6 below Carbonero	.99	.86	30*	10	760	52	U <5	U <5	340	330	150*	130
16 adit below Carbonero above tailings	U .25	U .25	U <4	U <4	5500	4800	U <5	U <5	1200	1200	35	33
17 adit below Carbonero above tailings	2.1	1.9	46	15	2600	1600	U <5	U <5	1600	1600	490	490
18 below tailings	1.3*	.62	33*	4	2100*	45	38*	U <5	360	170	290*	120
SCDMS SW fish Bench- marks	1.1		12		1000		3.2		--		110	

Highlighted numbers indicate concentrations 3 times that of upstream measurements.

Concentrations annotated with (*) indicate concentrations exceeding SCDMS surface water fresh water aquatic life benchmark.

CDPHE 000759

SILVER BELL MINE/MILL

TABLE III
INORGANIC ANALYTICAL RESULTS
GROUNDWATER AND AQUEOUS SOURCE
CHACTERIZATION SAMPLES
 Concentrations in micrograms per liter ($\mu\text{g/L}$)

Sample Location Sample Number Designation	GW-1 MHBY21 background	GW-2 MHBY22 Lake Fork deep well	GW-3 MHBY23 Lake Fork shallow well	SO-1 MHBY24 mine tunnel discharge
Parameter				
Aluminum	37.8 U	37.8 U	37.8 U	37.8 U
Antimony	25.5 U	25.5 U	25.5 U	36.2 J
Arsenic	4.9 UJ	7.3 UJ	12.2 UJ	9.4 UJ
Barium	22.5 J	16.5 J	8.2 J	7.5 J
Beryllium	1.5 U	1.5 U	1.5 U	1.5 U
Cadmium	2.2 U	2.2 U	2.2 U	2.2 U
Calcium	127000	124000	219000	154000
Chromium	2.5 U	2.5 U	2.9 J	2.5 U
Cobalt	10.4 U	10.4 U	10.4 U	10.4 U
Copper	67.3	8.3 UJ	16.3 J	20.1 J
Iron	92.3 J	1940	93.4 J	334
Lead	1.2 U	2.5 J	1.2 U	1.8 J
Magnesium	5530	7820	12000	16300
Manganese	3.0 J	2.43	2.21	3.16
Mercury	0.20 U	0.20	0.20 U	0.20 U
Nickel	13.6 U	13.6 U	13.6 U	13.6 U
Potassium	654 UJ	1060 UJ	2050 UJ	1760 UJ
Selenium	3.1 J	4.8 UJ	6.1 UJ	3.5 UJ
Silver	1.6 U	1.6 U	1.9 J	1.6 U
Sodium	3630 J	7550 J	23100 J	5800 J
Thallium	2.9 U	2.9 U	2.9 U	2.9 U
Vanadium	4.2 U	4.2 U	4.2 U	4.9 UJ
Zinc	153	40.1	77.5	73.8
Cyanide	5.0 U	5.0 U	5.0 U	5.0 U

U - parameter not detected in sample; value shown is sample detection limit

J - value is estimated because quality control criteria were not met

UJ - parameter not detected in sample; sample detection limit is estimated because quality control criteria were not met

CDPHE 000760

DAVID Black

DATE COLLECTED	DATE RECEIVED	DATE COMPLETED	SAMPLE CODE
02/03/94	02/11/94	02/21/94	9620319

CUSTOMER ADDRESS	
JOHN FAUSCH P.O. BOX 1194 TELLURIDE, CO 81435-	

DEALER ADDRESS	
LAKE FORK JCT Home Owners WELL #2	



DRINKING WATER ANALYSIS RESULTS

NOTE: "*" indicates that the MCL (Maximum Contaminant Level) has been exceeded, or in the case of pH is either too high OR too low.
 "ND" indicates that none of this contaminant has been detected at or above our detection level.
 "***" Result may be invalid due to lack of "Time Collected" or because the sample has exceeded the 30-hour time frame.
 "BD" Bacteria destroyed due to lack of collection information or because the sample has exceeded the 48 hour time frame.
 TNTC-Too Numerous To Count NBS-No Bacteria Submitted

Analysis performed	MCL (mg/l)	Detection Level	Level Detected
--------------------	------------	-----------------	----------------

Microbiological:

Total coliform (organism/100ml)	0	0	NBS
---------------------------------	---	---	-----

Inorganic chemicals - metals:

Aluminum	0.2	0.1	ND
Arsenic	0.05	0.010	ND
Barium	2.0	0.30	ND
Cadmium	0.005	0.002	ND
Chromium	0.1	0.004	ND
Copper	1.3	0.004	0.041
Iron	0.3	0.020	0.021
Lead	0.015	0.002	ND
Manganese	0.05	0.004	0.20*
Mercury	0.002	0.001	ND
Nickel	0.1	0.02	N
Selenium	0.05	0.002	ND
Silver	0.1	0.002	ND
Sodium	---	1.0	22
Zinc	5.0	0.004	0.025

Inorganic chemicals - other, and physical factors:

Alkalinity (Total as CaCO3)	---	10.0	100
Chloride	250	5.0	15
Fluoride	4.0	0.5	ND
Nitrate as N	10	0.5	ND
Nitrite as N	1.0	0.5	ND
Sulfate	250	5.0	580*
Hardness (suggested limit = 100)	---	10.0	660*
pH (Standard Units)	6.5-8.5	---	7.5
Total Dissolved Solids	500	20.0	941*
Turbidity (Turbidity Units)	1.0	0.1	ND

RECEIVED
FEB 23 1995
HAZARDOUS MATERIALS
AND WASTE MANAGEMENT

CDPHE 000761

DATE COMPLETED	SAMPLE CODE
02/11/94	02/21/94 7620310



CUSTOMER ADDRESS
JOHN FAUSCH
P.O. BOX 1174
TELLURIDE, CO 81435

DEALER ADDRESS
LAKE FORK JCT
WELL #1

DRINKING WATER ANALYSIS RESULTS

NOTE: "*" indicates that the MCL (Maximum Contaminant Level) has been exceeded, or in the case of pH is either too high OR too low.
 "ND" indicates that none of this contaminant has been detected at or above our detection level.
 "***" Result may be invalid due to lack of "Time Collected" or because the sample has exceeded the 30-hour time frame.
 "BD" Bacteria destroyed due to lack of collection information or because the sample has exceeded the 48-hour time frame.
 TINTC-Too Numerous To Count NBS-No Bacteria Submitted

Analysis performed	MCL (mg/l)	Detection Level	Level Detected
--------------------	------------	-----------------	----------------

Microbiological:

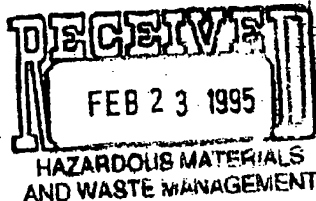
Total coliform (organism/100ml)	0	0	NBS
---------------------------------	---	---	-----

Inorganic chemicals - metals:

Aluminum	0.2	0.1	ND
Arsenic	0.05	0.010	ND
Barium	2.0	0.30	ND
Cadmium	0.005	0.002	ND
Chromium	0.1	0.004	ND
Copper	1.3	0.004	0.014
Iron	0.3	0.020	0.070
Lead	0.015	0.002	ND
Manganese	0.05	0.004	0.17*
Mercury	0.002	0.001	ND
Nickel	0.1	0.02	ND
Selenium	0.05	0.002	ND
Silver	0.1	0.002	ND
Sodium	---	1.0	6.6
Zinc	5.0	0.004	0.027

Inorganic chemicals - other, and physical factors:

Alkalinity (Total as CaCO3)	---	10.0	80
Chloride	250	5.0	ND
Fluoride	4.0	0.5	ND
Nitrate as N	10	0.5	ND
Nitrite as N	1.0	0.5	ND
Sulfate	250	5.0	309*
Hardness (suggested limit = 100)	---	10.0	380*
pH (Standard Units)	6.5-8.5	---	7.5
Total Dissolved Solids	500	20.0	516*
Turbidity (Turbidity Units)	1.0	0.1	0.2



CDPHE 000762

Report Date: 09/27/96

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
WCED - DRINKING WATER SECTION

Note: Computer data is always subject to error. If data appears unusual or questionable,
please confirm the validity with the Drinking Water Section at (303) 692-3500.

WATER QUALITY DATA FOR ID 157600 - Ophir, Town of
ATTN: Paul Machado
Box 683
Ophir, CO 81426

Contact: Machado, Paul	County: San Miguel	Disinfection Waiver: ? No
Contact Phone: (970)728-4519	Active Status: Active	Bacta Required: 1
Operator: Wolfe, Doug wtr comm	Activation Date: 0/	Bact Cycle: Monthly
Operator Phone: (970)728-3735	System Begin Date: 0/	Nitrate Schedule: 2nd Quarter
Resident Population: 75	System Type: Community	Chemical Schedule Group: J
Non-Transient Population: 0	System Source Type: Ground Water	Inorganic Schedule: 2nd Quarter
Transient Population: 0	Open Year Around	Radiological Schedule: 2nd Quarter
Service Connections: 36		Organic Schedule: Routine - 4 Quarters

***** SOURCE INFORMATION *****

se_id	srcnum	src	se_rec_type	se_code	avail	sampoint	seller_id	totaldepth	aquifer
001	GWTP01	Ophir WTP	P	T	P	.T.			Has SW contamination
002	Srf01	Waterfall Creek-DISCONTINUED	S	S	Z	.F.			
003	Spr01	Spring #1	S	G	P	.F.			

***** RECENT BACTERIOLOGICAL *****

*** s = Safe ***** U = Unsafe ***** N = Invalid ****

samp_date type testmeth quantity tc_pres fa_pres invalid

07/23/95	r	m	1 s			
08/15/95	r	m	1 s			
09/26/95	r	m	1 s			
10/26/95	r	m	1 s			
11/29/95	r	m	1 s			
12/26/95	r	m	1 s			
01/23/96	r	m	1 s			
02/05/96	r	m	1 s			
03/26/96	r	m	1 U			
04/08/96	r	m	1 N			
04/11/96	s	m	1 s			
04/24/96	r	m	1 s			
04/29/96	r	m	2 s			
04/30/96	r	m	2 s			
05/09/96	r	m	1 s			
06/10/96	r	m	1 s			
07/17/96	r	m	1 s			
08/13/96	r	m	1 s			

***** ORIGINAL INORGANICS *****

***** all results and MCLs expressed in mg/l or ppm *****

** MCLs are	0.05	2	0.005	0.1	4.0	na	0.002	0.05	na	na
SAMPLEDATE	ARSENIC	BARIUM	CADMIUM	CHROMIUM	FLUORIDE	LEAD	MERCURY	SELENIUM	SILVER	SODIUM
	SE_ID_1	SE_ID_2	SE_ID_3	SE_ID_4	SE_ID_5					
07/30/85	0.000	0.000	0.00000	0.0000	0.000	0.0000	0.00000	0.000	0.0000	0 001
09/14/90	0.000	0.000	0.00000	0.0000	0.930	0.0000	0.00000	0.000	0.0000	0 001

CDPHE 000763

	As	Ba	Cd	Cr	F	Pb	Hg	Se	Ag	Na
09/14/90	0.000	0.000	0.00000	0.0000	0.430	0.0000	0.00000	0.000	0.0000	0
06/28/91	<0.001	<1.0	<0.005	<0.02	0.56	<0.02	<0.001	<0.001	<0.010	3.2
06/28/91	<0.001	<1.0	<0.005	<0.02	0.14	<0.02	<0.001	<0.001	0	1.1
12/29/93	<0.001	0.010	<0.00025	<0.010	0.51	<0.005	<0.0002	<0.001	NT	4.3
06/30/94	<0.001	0.01	<0.00025	<0.01	0.55	<0.005	<0.0002	<0.001	NT	3.8

***** NEW INORGANIC PARAMETERS *****

***** all results expressed in mg/l or ppm *****

***** TESTING BEGAN JAN 1, 1993 *****

-- MCLs are 0.006 0.004 0.2 0.1 na 0.002

SAMPLEDATE ANTIMONY BERYLLIUM CYANIDE NICKEL SULFATE THALLIUM COMPOSITED SE_ID_1 SE_ID_2 SE_ID_3 SE_ID_4 SE_ID_5

12/29/93	<0.001	<0.001	NT	<0.020	420	<0.001	.F.	001
06/30/94	<0.001	<0.001	NT	<0.02	360	<0.001	.F.	001

***** NITRATE/NITRITE *****

***** all results expressed in mg/l or ppm *****

-- MCLs are 10.0 1.0 10.0

sampledate nitrate_n nitrite_n no3_no2_n se_id_1 se_id_2 se_id_3 se_id_4 se_id_5

07/30/85	0.00			001
09/14/90	0.00			001
09/14/90	0.00			001
06/28/91	<0.04			001
06/28/91	0.12			001
06/30/94	NT	NT	<0.5	001
03/27/95	NT	NT	<0.5	003
06/27/95				001
06/27/95	NT	NT	<0.5	001

***** LEAD/COPPER TAP MONITORING DATA *****

***** levels are 90th percentile levels expressed in mg/l *****

beg_compl end_compl ph_90th cu_90th

07/01/93	12/31/93	0.005	0.30
01/01/94	06/30/94	0.005	0.23
01/01/95	12/31/95	0.002	0.70
01/01/97	12/31/97		

mcl 0.015 1.3

***** RADIOLOGICAL *****

***** all results expressed in pCi/l, except TS in mg/l *****

PLANTNUMB SAMPLEDATE SAMPYTYPE ALPHA ADJ_ALPHA BETA RA226 RA228 RA226_228 URANIUM TS RADON_222

1	06/01/84	R	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0
1	03/15/89	G	0.0	0.0	0.0	0.00	0.00	0.00	0.0	460
1	09/14/90	G	2.0	0.0	0.0	0.00	0.00	0.00	0.0	310
1	09/14/90	G	4.0	0.0	2.0	0.00	0.00	0.00	0.0	740
WTP01	08/09/94		<3	NT	<3	NT	NT	NT	NT	670 NT
WTP01	12/31/94		3.0	NT	<3	NT	NT	NT	NT	780 NT
Sp01	03/27/95		HS	NT	HS	<1	<1	NT	<2	860 NT
GWTP01	06/27/95		HS	NT	HS	<1.0	NT	NT	NT	<2.0 NT

***** CORROSIONITY *****

***** all units are mg/l except Langlier, pH, and temp *****

sampledate langlier tot_alk ca_hard ph tds water_temp chloride sulfate

09/14/90	.33	72H	460	8.2	670	42
09/14/90	-0.13	56H	180	8.2	250	46
06/28/91	0.60	73	224	7.98	785	
06/28/91	-0.93	32	25.2	7.64	100	

CDPHE 000764

12/29/93 NT NT NT NT 690 NT NT NT

*** There was no trihalomethane data found. Required for community systems serving 10,000 or more only. ***

***** Phase I VOC'S *****

Note: Included as part of Phase II/V organics as of 1/1/93.
Refer to file for information on detects.

plantname plantname sampled detected
1 Ophir, Town of 03/12/91 No voc's detected.

***** REGULATED PHASE I/II/V ORGANICS *****

Sources: 001 03/23/95 Composit: F *** There were no regulated detects in this sample. ***

***** UNREGULATED PHASE I/II/V ORGANICS *****

Note: Detections of Trihalomethanes are not printed.
Monitoring is required. No standards have been set.

Sources: 001 03/23/95 Composit: F *** There were no unregulated detects in this sample. ***

*** There were no chemical check sample tracking records found. ***

***** VIOLATIONS - (Back and Turbidity) *****

BEG_COMPLI	END_COMPLI	VIOL_TYPE	CONTAMINAT	RESAMPLES	VALID_SAN	RESULT	MCL_VIOLAT	ENF_DATE	TYPE	LETR	EPA_CODE
04/01/86	04/30/86		3000	0	0	7.50000000	1.00000000	05/29/86	1		A
10/01/86	10/30/86		3000	0	0	4.00000000	1.00000000	12/10/86	2		E
04/01/87	04/30/87		3000	0	0	4.00000000	1.00000000	/ /	P		E
10/01/88	10/31/88	03	0100	1	0	0.00000000	0.00000000	/ /			6
11/01/88	11/30/88	03	0100	1	0	0.00000000	0.00000000	/ /			6
12/01/88	12/31/88	03	0100	1	0	0.00000000	0.00000000	/ /			6
01/01/89	01/31/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
02/01/89	02/28/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
03/01/89	03/31/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
04/01/89	04/30/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
05/01/89	05/31/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
06/01/89	06/30/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
07/01/89	07/31/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
08/01/89	08/30/89	02	3000	0	0	6.20000000	1.00000000	10/30/89	1		EA
08/01/89	08/31/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
09/01/89	09/30/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
10/01/89	10/31/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
11/01/89	11/30/89	02	3000	0	0	2.00000000	1.00000000	02/05/90	2		EA
11/01/89	11/30/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
12/01/89	12/31/89	03	0100	1	0	0.00000000	0.00000000	/ /			6
01/01/90	01/31/90	03	0100	1	0	0.00000000	0.00000000	/ /			L
02/01/90	02/28/90	03	0100	1	0	0.00000000	0.00000000	/ /			L
03/01/90	03/01/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
04/01/90	04/30/90	02	3000	0	0	5.50000000	1.00000000	05/24/90	P		JE
04/01/90	04/30/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
05/01/90	05/31/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
06/01/90	06/30/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
07/01/90	07/31/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
08/01/90	08/31/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
09/01/90	09/30/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
10/01/90	10/31/90	02	3000	0	0	8.00000000	1.00000000	12/04/90	P		JE
10/01/90	10/31/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
11/01/90	11/30/90	03	0100	1	0	0.00000000	0.00000000	/ /			JEL
12/01/90	12/31/90	02	3000	0	0	2.00000000	1.00000000	01/25/91	P		JEL

CDPHE 000765

12/01/90	12/31/90	03	0100	1	0	0.00000000	0.00000000	/ /	JEL
01/01/91	01/31/91	03	0100	1	0	0.00000000	0.00000000	/ /	JEL
02/01/91	02/28/91	03	0100	1	0	0.00000000	0.00000000	/ /	JEL
03/01/91	03/31/91	03	0100	1	0	0.00000000	0.00000000	/ /	JEL
04/01/91	04/30/91	03	3000	1	0	0.00000000	0.00000000	06/01/91 P	JEL
04/01/91	04/30/91	03	0100	1	0	0.00000000	0.00000000	/ / P	JEL
05/01/91	05/31/91	25	3100	4	0	0.00000000	0.00000000	/ / 1	AEF
05/01/91	05/31/91	03	0100	1	0	0.00000000	0.00000000	/ / P	JEL
06/01/91	06/30/91	22	3100	0	0	0.00000000	0.00000000	10/08/91 P	JEL
06/01/91	06/30/91	03	0100	1	0	0.00000000	0.00000000	/ /	JEL
07/01/91	07/31/91	26	3100	5	2	0.00000000	0.00000000	11/01/91 1	JE
07/01/91	07/31/91	21	3100	0	0	0.00000000	0.00000000	10/08/91 1	JE
07/01/91	07/31/91	03	0100	1	0	0.00000000	0.00000000	/ /	LE
08/01/91	08/31/91	24	3100	4	2	0.00000000	0.00000000	11/20/91 1	JE
08/01/91	08/31/91	03	0100	1	0	0.00000000	0.00000000	/ /	LE
09/01/91	09/30/91	03	0100	1	0	0.00000000	0.00000000	/ /	LE
03/01/96	03/31/96	23	3100	1	0			04/15/96 1	SFJ

***** CHEMICAL VIOLATIONS *****

beg_compli	end_compli	viol_type	contaminat	reqsamples	valid_sam	result	mcl_violot	enf_date	type_lettr	epa_code	delete
01/01/93	12/31/93	03	1040	1	0	0.00000000	0.00000000	03/06/95	1	S06	

***** ENFORCEMENT ACTIONS for CHEMS *****

**** SFJ = violation letter - SDX = now in compliance ****
 enf_date epa_code type_lettr comments

06/30/96 SDX Nitrate SDX/FTM 1993

*** There were no state monitoring violations found. ***

*** There are no outstanding enforcement orders. ***

Please Note:

NT = Not Tested
 ND = None Detected
 BDL = Below Detection Limit
 < symbol for less than
 na = Not Applicable

GW = ground water
 SW = surface water
 GWISW = ground water under the influence of surface water
 MCL = maximum contaminant level
 VOC = volatile organic chemical
 SWTR = surface water treatment rule

CDPHE 000766

STATE OF COLORADO

COLORADO DEPT OF PUBLIC HEALTH & ENVIRONMENT
WATER QUALITY CONTROL DIVISION
4300 CHERRY CREEK DRIVE SOUTH
DENVER, CO 80222-1530

303/692-3500
FAX: 303/782-0390

DELIVER TO: Camillie Jarrell FAX# 1-970-728-3415
COMPANY/AGENCY: CDPH & E. Hwy. Materials Waste Mgmt Di
FROM: Weather Holmes, CDPHE-WQCD PHONE # 303-692-3547
NUMBER OF PAGES TO FOLLOW: 4

CDPHE 000767

APPENDIX 8

CARBONERO MINE HISTORY EXCERPT

CDPHE 000768

THE R • G • S STORY

RIO GRANDE SOUTHERN

VOLUME III

Over the Bridges...

VANCE JUNCTION TO OPHIR

RUSS COLLMAN • DELL A. MCCOY
AND
WILLIAM A. GRAVES



SUNDANCE PUBLICATIONS *Limited*

250 BROADWAY • DENVER, COLORADO 80203

Published by...

Sundance Publications, Limited
Denver, Colorado

Production Manager — Dell A. McCoy

Photographic Director — Steven J. Meyers

Editorial Consultants —

Ed J. Haley, Robert W. Richardson, John W. Maxwell, Robert A. LeMassena, Stan Schwedler, Al Chione, Robert F. Shank Sr., Gabe Bradford, Herb Kelsey, Jim L. Key, William A. Graves, Mark S. Kramer and Robert W. McLeod

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ISBN 0-913582-50-6

Mile By Mile... Station By Station...

THE R • G • S STORY allows you — the reader — to cover the entire route of the legendary Rio Grande Southern Railroad, beginning at Ridgway, Colorado, the lonely northern terminal of this little narrow-gauge line. Over time and space, the volumes of this detailed chronicle will lead you over every mile and past every station of the RGS — over the high mountains of the San Juan Region and across the spindly timber bridges to Durango, Colorado, the bustling southern terminal of this enchanting railroad.

DONALD G. HILLS PHOTO

FRONT COVER —

"Galloping Goose" No. 4...

Railbus No. 4 of the Rio Grande Southern was about to head up the Telluride Branch in this scene. She was photographed just prior to departing from Vance Junction on May 23, 1950. Called the "M-4" by RGS employees (meaning "Motor 4"), this "Galloping Goose" was one of four similar railbuses in service on the railroad at this time, Numbers 3, 4, 5 and 7 — not counting No. 6, the "work Goose" equipped with a flatbed. The old coach body originally served as the Vance Junction depot, while the two-story building behind the Galloping Goose was the section house.

BACK COVER —

Lizard Head Peak in the Distance...

The unusual rock formation called Lizard Head — chosen for the Rio Grande Southern Railroad's original emblem, or herald — appears in this view. Beautiful Alta Lakes, located high above the Ophir Loop, catch winter's runoff water in this alpine basin near timberline. The Rio Grande Southern headed south from the Ophir Loop, climbing up past the gem called Trout Lake to Lizard Head Pass and on south through the beautiful scenery in this part of the San Juan Region of southwestern Colorado — to be portrayed in Volume IV of THE R • G • S STORY.

DELL A. MCCOY PHOTO

CDPHE 000769

The Mines in the Ophir Loop Area

By William A. Graves



No. 6

THE PROSPECTS of rich revenue generated by freight and ore shipments to and from gold and silver mines was the reason that the Rio Grande Southern Railroad was built. Otto Mears loved to gamble, and his mining investments and his investments in the Rio Grande Southern were his ultimate gambles. The success or failure of the Rio Grande Southern depended on the success or failure of the precious-minerals mines it served. In turn, many mines could never have been profitably worked without the relatively cheap and efficient transportation of the Rio Grande Southern.

When the Rio Grande Southern was constructed in 1890 and 1891, there were a great number of mines in the Ophir Loop area, southwest of Telluride. *The San Miguel Examiner*, the weekly newspaper of the local county, reported on over 75 mines by name in the Ophir Loop area at the turn of the century. However, many of these mines were worked very little, only enough to satisfy the annual \$100 worth of improvements required to maintain a claim.

This chapter of Volume III describes eight mines located on or above the Ophir Loop, which were highly developed and produced considerable amounts of ore.

These eight mines were all within four miles of the Ophir station, and each had its own processing mill. Rich ore, known as high-grade or first-class ore, was not milled before it was shipped to a smelter. However, second-class ore was milled, and the concentrates produced from the milling process were shipped to smelters. Milling usually reduced five tons of ore to one ton, and this reduction greatly lowered the transportation costs and made it profitable to mine and mill low-grade ore. At different times, ore from the Ophir Loop area went to smelters in Durango, Denver, Pueblo, Salida and Leadville. Gold bars produced by amalgamation at some of the mills were shipped via the Rio Grande Southern and the Denver & Rio Grande railroads to the U.S. Mint in Denver.

The span of years that these mines were active was from about 1877 to 1968. However, it

MINING PRODUCTION IN THE OPHIR LOOP AREA OF COLORADO
— 1901-1968 —

MINE	GOLD, oz.	SILVER, oz.	COPPER, lbs.	LEAD, lbs.	ZINC, lbs.	VALUE - \$
ALTA						
Quantity	74,976	2,745,160	1,547,939	17,577,886	—	
Value	\$ 2,017,047	1,968,759	213,158	906,980	—	5,105,944
BUTTERFLY						
Quantity	41,064	542,157	217,570	1,423,166	—	
Value	\$ 900,343	366,630	24,222	71,987	—	1,363,182
CARBONERO						
Quantity	2,314	1,259,864	523,622	21,557,385	238,711	
Value	\$ 59,086	821,629	91,451	1,480,174	29,401	2,481,741
CARRIBEAU						
Quantity	3,545	666,653	64,527	1,601,978	—	
Value	\$ 75,547	402,310	9,489	76,172	—	563,518
SAN BERNARDO						
Quantity	1,582	620,068	210,664	2,798,266	8,700	
Value	\$ 33,751	446,613	31,355	180,361	1,213	693,293
SILVER BELL						
Quantity	17,418	659,443	353,437	1,890,092	—	
Value	\$ 457,472	554,378	76,867	246,081	—	1,334,798
TOTAL VALUE WHEN MINED	\$ 3,543,246	4,560,319	446,542	2,961,755	30,614	11,542,476
PERCENTAGE OF TOTAL VALUE	30.7	39.5	3.9	25.7	0.2	
TOTAL VALUE IN 1993 DOLLARS	\$ 45,975,343	23,122,801	2,792,295	14,991,607	123,705	87,005,751

IT IS WORTH NOTING from the last line in the above chart how much metal values have become inflated since these mines were active. The same quantities of ore that had a value of \$11,542,476 when produced would have a value of \$87,055,751 in 1993. It is also interesting to notice how *little* the ore was worth — even in 1993 dollars. Today's values would be divided as: 53-percent gold, 27-percent silver, 3-percent copper and 17-percent lead.

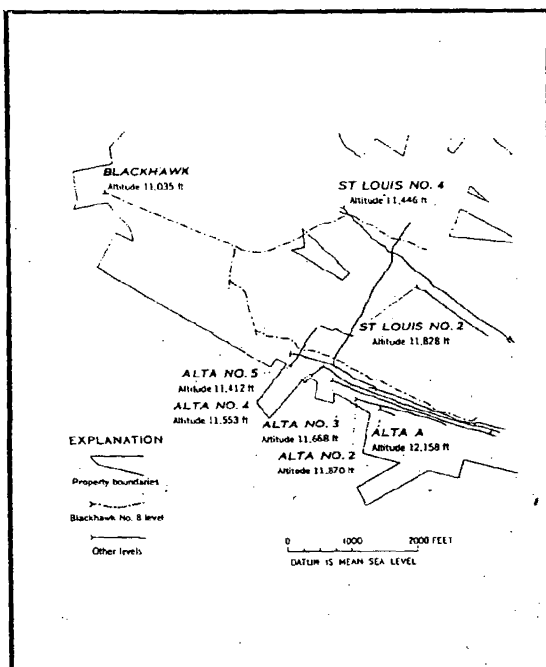
should be pointed out that no single mine operated all of those years. The typical mine in this historic account operated for about 50 years on an intermittent basis. Most of the mining activity was during the years that the Rio Grande Southern Railroad was in operation, from 1890 until 1951.

Income for these eight mines depended on the recovery of four metals: gold, silver, copper and lead. Small amounts of zinc and molybdenum were also recovered. From mine production data submitted to the U.S. Bureau of Mines and furnished through the courtesy of the mine owners and the Bureau of Mines, the total value of metals produced by six of these mines from 1901 until 1968 can be calculated as \$11,542,

476. Thirty-nine percent of the value was in silver, 31 percent was in gold, 26 percent in lead and four percent in copper.

Production prior to 1901 cannot be determined because there are no production records for the years before 1901, the year that the Bureau of Mines was created. Two of the eight mines in this account are not included in the above value, or in the table above, because most of their production appears to have been prior to 1901. The Mining Production table provides more detailed information about quantities and values of each mine's production.

It is worth noting that two of the most productive mines, the Alta and the Butterfly, produced more value in gold than they did in silver.



USGS BULLETIN NO. 1112-G - WILLIAM A. GRAVES COLLECTION

AS THE MAJOR MINES in the Ophir Loop area were developed, they were worked on many different levels. Work began at the surface at a promising location, and when the excavation or mine shaft was 100 to 200 feet deep, a lower tunnel was usually drilled to facilitate the removal of ore. If the mine was profitable, this procedure was repeated over and over. The little map above of the Alta Mine shows a good example of this type of development. The highest level was called the Alta "A" and is at an altitude of 12,158 feet above sea level. The lowest level is the Blackhawk Tunnel, at 11,035 feet. Levels were usually about 150 feet apart, but only the most promising levels were developed. At the Alta Mine five levels were developed in Gold King Basin; however, Levels 6 and 7 were never drilled out. The many levels of the mines is one reason that elevations differed from one publication to another. It should be noted that there was a distance of a little more than one mile from the highest workings of the mine to the lowest tunnel portal at the Alta. For this reason, the exact published location of a mine such as the Alta may easily cause confusion.

OPHIR AREA MILL DATES

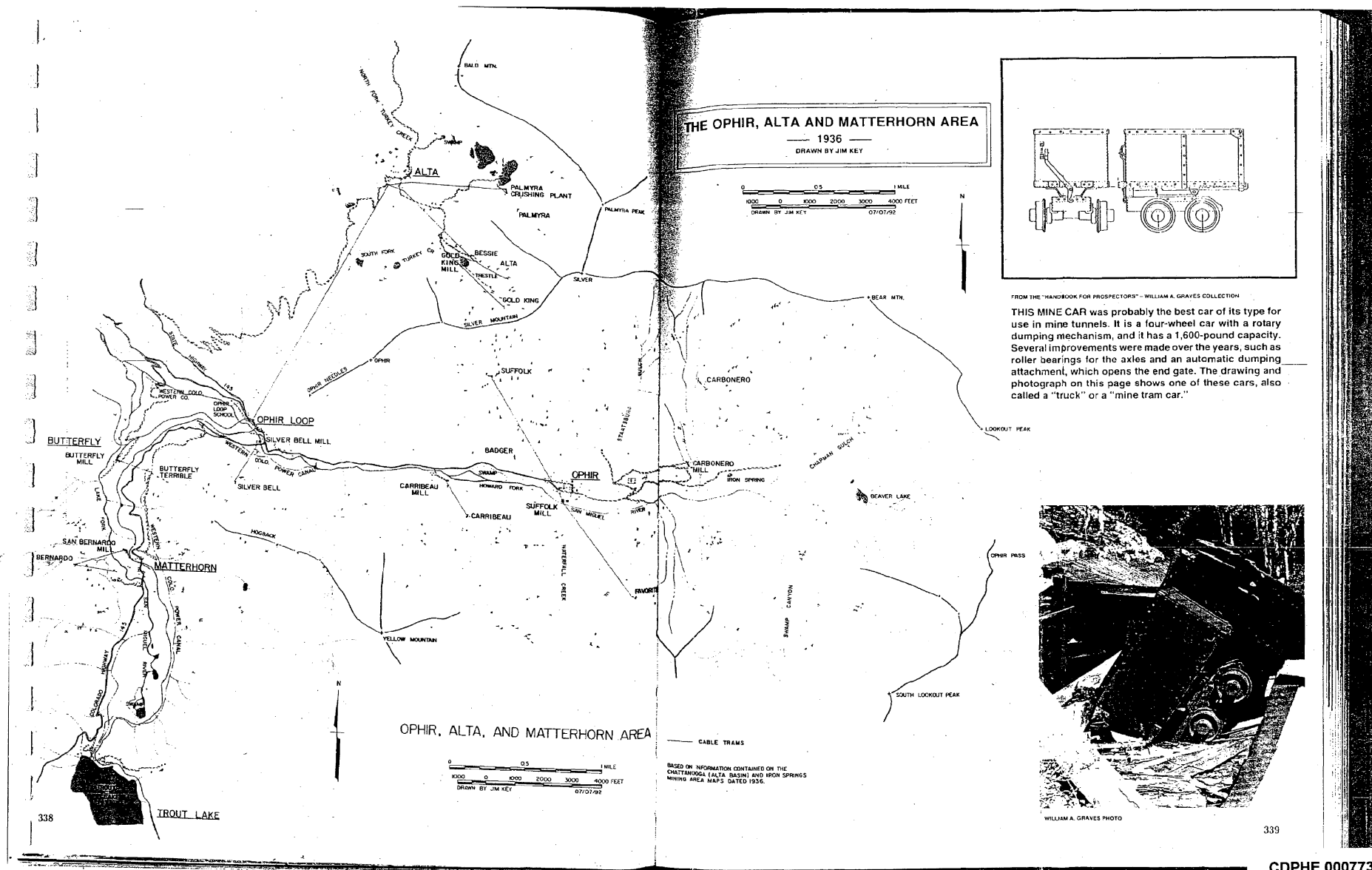
MILL	FIRST YEAR	LAST YEAR
ALTA		
No. 1	ca. 1902	ca. 1918
No. 2	ca. 1918	1929
No. 3	1938	1948
BUTTERFLY		
No. 1	1898	1927
No. 2	1927	1940
CARBONERO		
No. 1	1924	1950
CARRIBEAU		
No. 1	1896	unknown
GOLD KING		
No. 1	1882	unknown
SAN BERNARDO-MATTERHORN		
No. 1	ca. 1890	1909
No. 2	1920	standing 1993
SILVER BELL		
No. 1	1901	standing 1993
SUFFOLK		
No. 1	ca. 1895	1937

This was not unusual. Gold production in the Telluride and Ophir areas has often been overlooked because the region has been commonly referred to as "the Silver San Juans." However, the value of gold shipped from San Miguel County far exceeded the value of silver. Charles W. Henderson, in U.S. Geological Survey professional paper No. 138, states that gold produced in San Miguel County between 1875 and 1923 had a value of \$59,450,591, as compared with a silver-production value of \$31,599,544.

The mines relied on the Rio Grande Southern, and the RGS depended on the mines. When the RGS was blockaded by snow, ice, mud or floods, the mines could not ship their ore, and they were often forced to shut down. And as the mines finally closed down, one by one, the Rio Grande Southern died a slow death.

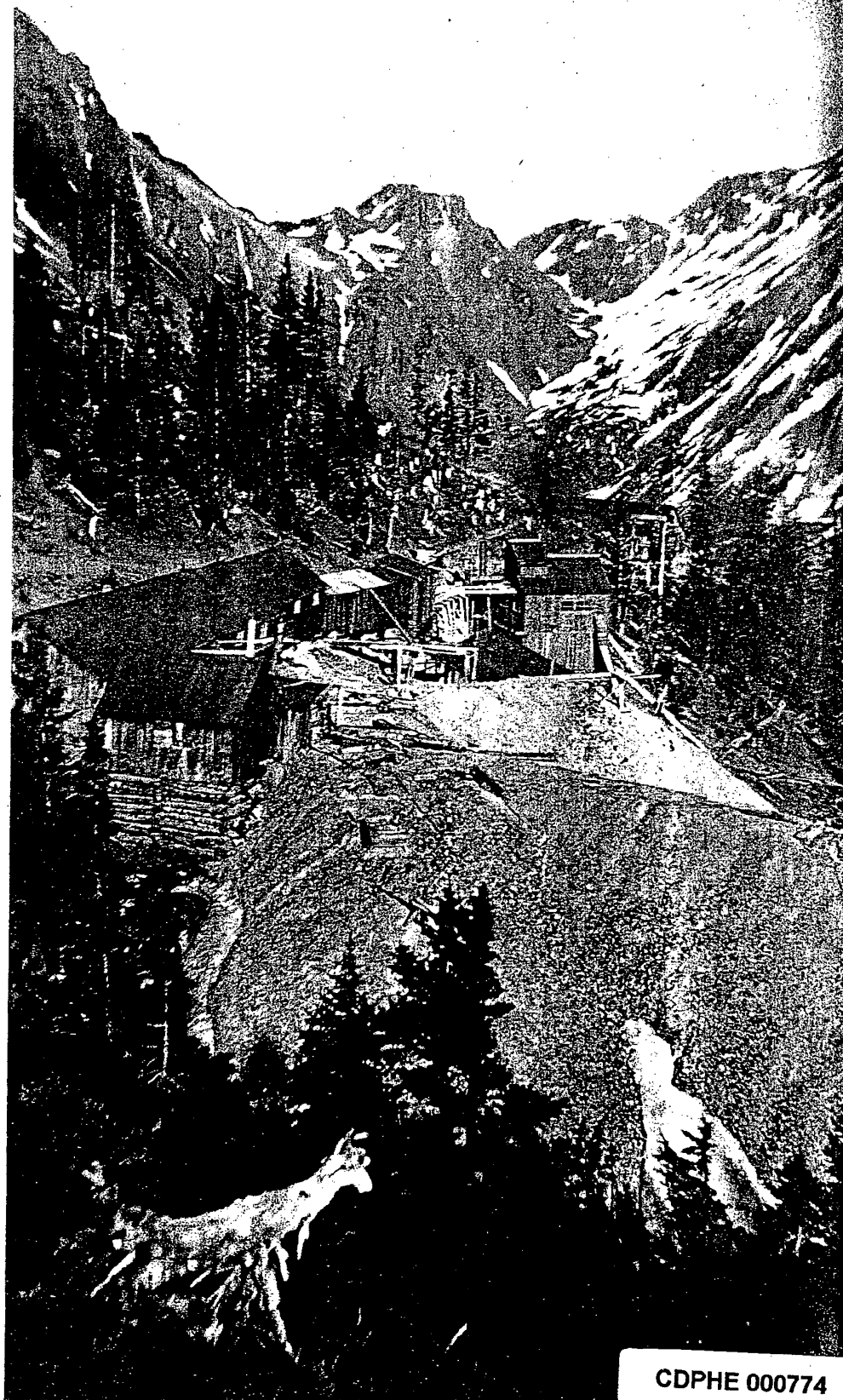
This chapter is a detailed history of these eight mines, presented in alphabetical order, or nearly so, in the basins that they occupied beginning with Gold King Basin, in the scenic Alta Lakes area — east of the Ophir Loop.

(Continued on Page 340)

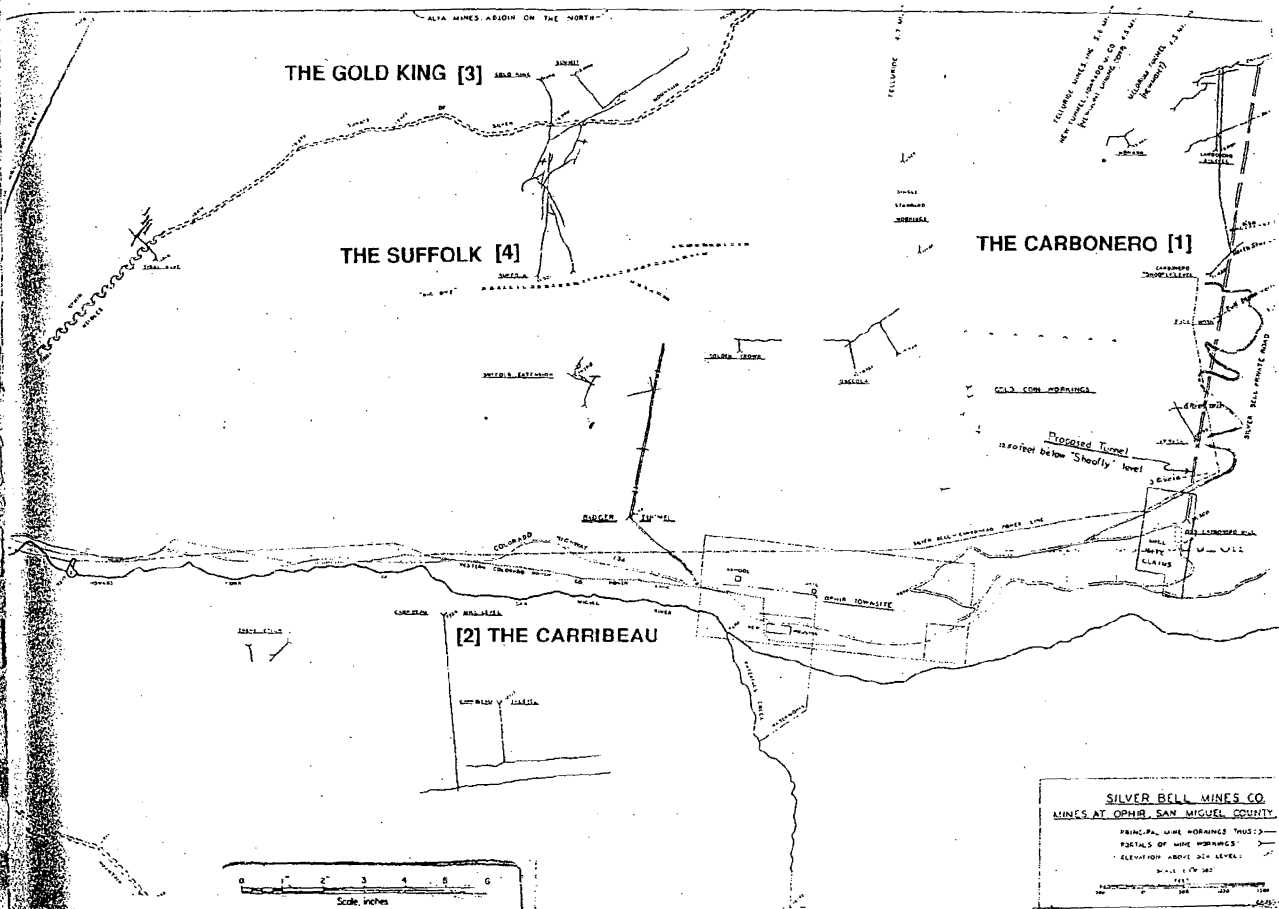


GRACE AND HAROLD BREWER
COLLECTION

THE CARBONERO
Mine was located
high on the side of
Silver Mountain.
These buildings
were at the en-
trance to the mine's
Shoofly Tunnel. The
Shoofly was at
Level 8 — and at
11,480 feet in ele-
vation, it was the
Carbonero Mine's
lowest level!



SILVER BELL MINES COMPANY MINES AT OPHIR, SAN MIGUEL COUNTY



MAP COURTESY OF FLEET RESOURCES - U.S. BUREAU OF MINES COLLECTION

THE MINING TOWN of Ophir was actually located in the lower lefthand corner of the Ophir Townsite rectangle that is shown on this map produced during the early 1950's. Four of the mines that appear on this map have their histories documented elsewhere in this volume. The four mines are: [1] the Carbonero, [2] the

Carribeau, [3] the Gold King and [4] the Suffolk. The Suffolk Mine's ore-processing mill had burned down before this map was drawn; however, it was in the lower lefthand corner of the townsite rectangle, near the confluence of the Howard Fork of the San Miguel and Waterfall Creek.

The CARBONERO and TIDAL WAVE MINES

THE CARBONERO MINE was about a mile and a half from Ophir, on the south side of Silver Mountain, above timberline, at an elevation of 12,500 feet. It was located by a local prospector named Jerry Cole and was first worked by George

Pickett about 1897. Pickett held a major interest in the mine, but he shared its ownership with three other Colorado Springs investors.

George Pickett first came to the Ophir area from Colorado Springs in 1883, as a 16-year-old high-school boy looking for a summer job. He was hired to collect toll fees on the the newly-completed Ophir Pass toll road. Pickett liked the

However, Pickett did not have the money to build a mill to concentrate the ore before shipping it to a smelter. And that was a major handicap. Ore had to be hand-sorted, and only ore that had good silver values went to the smelter. The ore was sacked at the mine and carried by pack animals to the Rio Grande Southern's Ophir station. The ore then went to the Ohio & Colorado Smelting & Refining plant in Salida. Each sack of ore in this crude state was worth \$3.00 to \$4.00, and during some months, production reached 1,000 sacks. A typical production for a year was worth about \$25,000.

In 1903 and 1904, two additional claims were acquired, the North Star and the Mohawk. These claims were needed to work the mine at lower levels. A new crosscut tunnel was started in 1906.

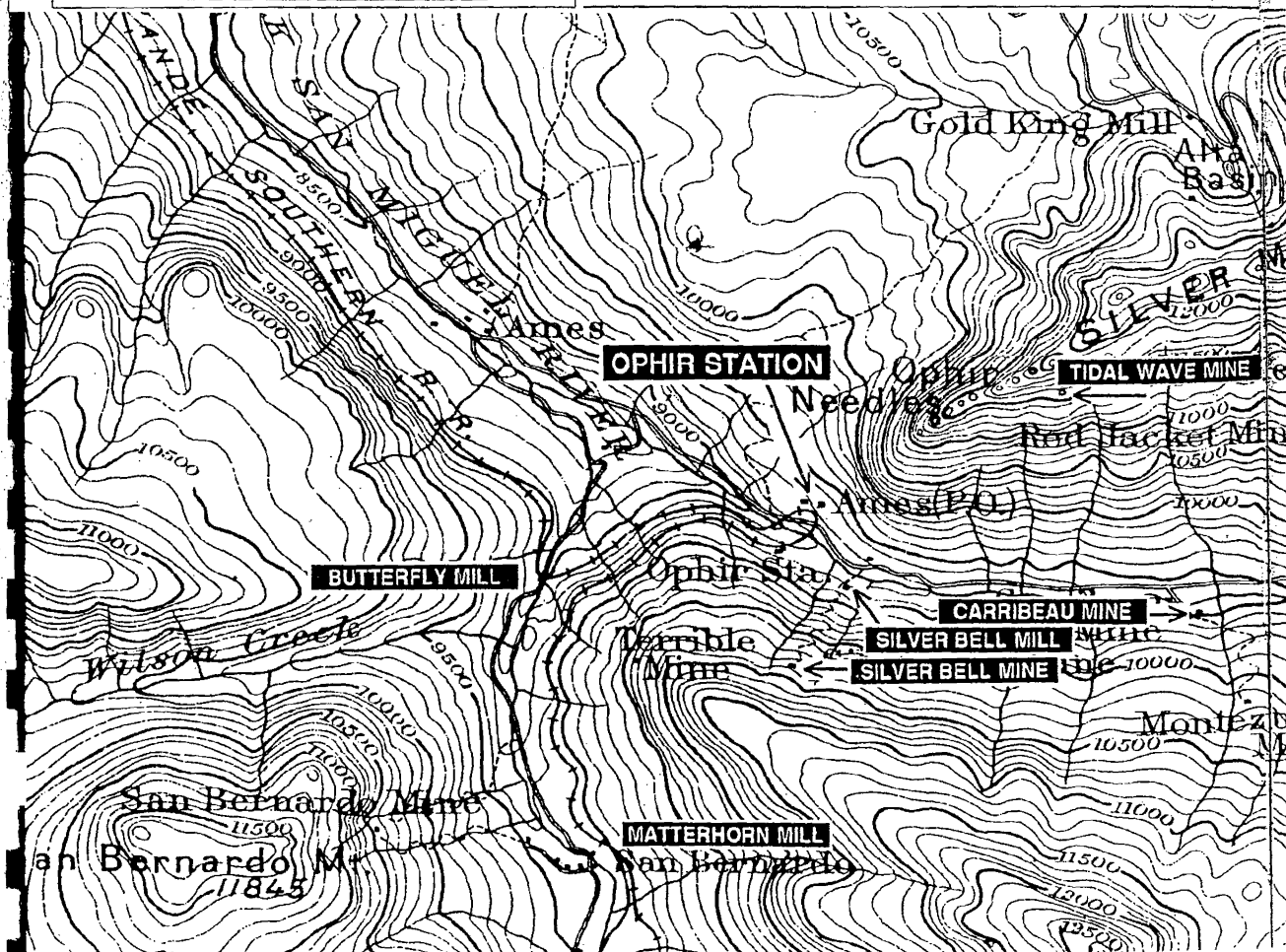
MAP SHOWING THE POSITIONS OF MINES AND MILLS IN CONNECTION WITH OPHIR AND THE RIO GRANDE SOUTHERN RAILROAD

USGS MAP - 1904 EDITION - COURTESY OF RON RUHOFF

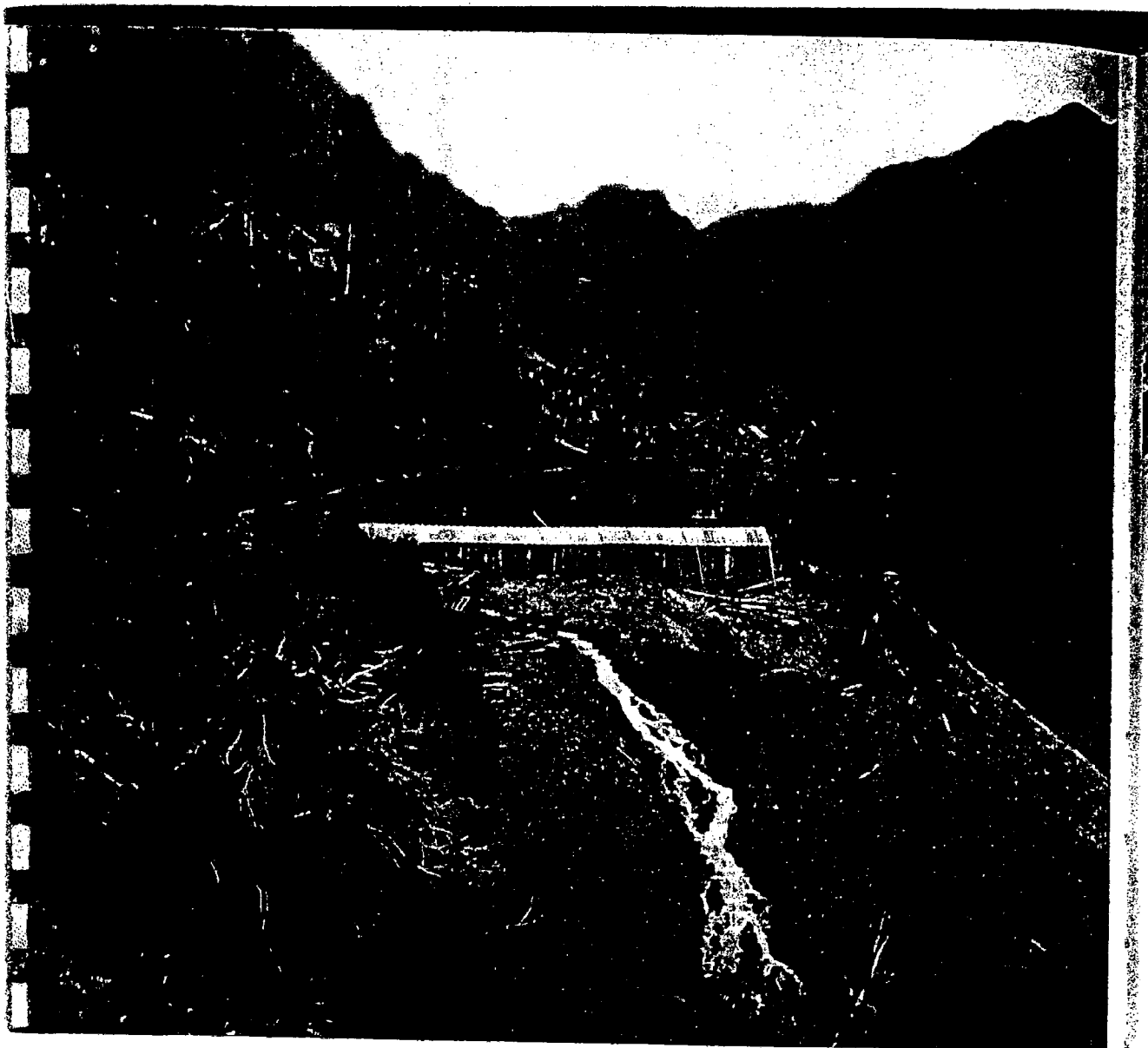
It reached the Carbonero vein during November of 1907. Production dropped in 1907, while most of the miners were tunneling, but it bounced back in 1908. Employment during the early years was about 10 to 12 men; however, it gradually increased to about 15 to 20 by 1910. The mine was worked on three different levels.

George Pickett broadened the Carbonero's financial base in 1909, by forming and incorporating the Carbonero Mines & Reduction Company in Colorado Springs. This company kept ownership of the Carbonero for the next 40 years, but it often leased parts of the mine to others.

During 1910, Pickett obtained an interest in the nearby Suffolk mine and mill, and the operation of the Carbonero was turned-over to lessees. Ore-production was good in 1912, 1913 and 1914, but dropped to zero in 1916. The Carbonero had a bad year in 1916. A snowslide in January killed four Carbonero men, who were



CDPHE 000776



KATE MULVEY PHOTO - WILLIAM A. GRAVES COLLECTION

THE BUILDINGS at the Carbonero's Shoofly Tunnel were photographed during 1929 or 1930. About 30 to 40 men were employed in the mine at that time. A row

of workers' houses can be seen a short distance from the mill buildings, and a boarding house for single men was up on the hill. Ophir Pass is in the distance.

Leases on the Carbonero Mine ran out in 1917, and the Carbonero Mines & Reduction Company took back operation of the mine. The firm realized good production for two years and then leased the mine to someone else again. The new lessee was the Ruutilla-Brown Leasing Company, a Colorado company. This company operated the mine for four years and boosted annual ore-production to \$75,000; however, the mine was really handicapped without a mill.

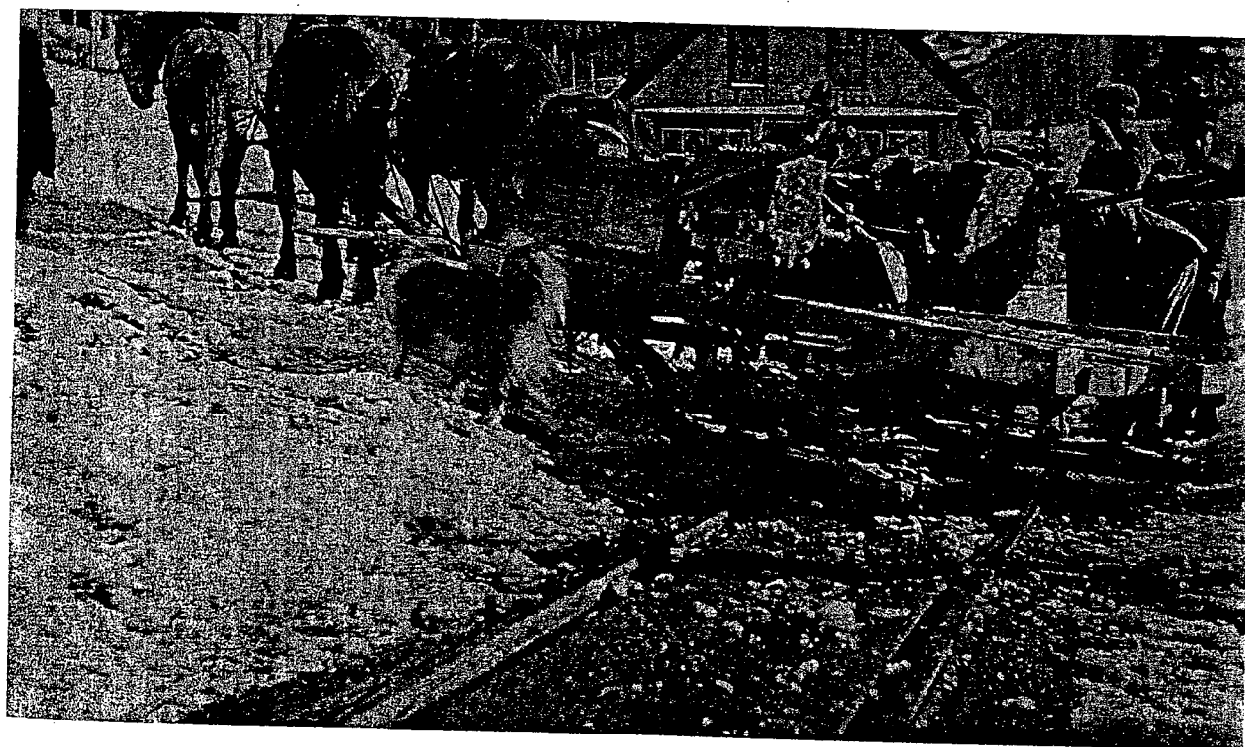
The Carbonero Mine needed a mill to profitably mine the low-grade ore at the Shoofly level. A mill could concentrate the ore and greatly reduce transportation costs. During 1923, the Tejon Investment Company of Colorado Springs, headed by former Governor Oliver Shoup, leased the Carbonero. In the following year, they constructed a new 50-ton-per-day mill and a new bunkhouse. The mill used the froth-flotation process, which was popular at that time. It was served by a

(Continued on Page 417)



WILLIAM A. GRAVES COLLECTION

THIS PLAYFUL snowy view helps you to better understand how Carbonero families adjusted to a harsh, high-altitude environment. These shacks provided homes for miners at the Carbonero's Shoofly Tunnel, near timberline.

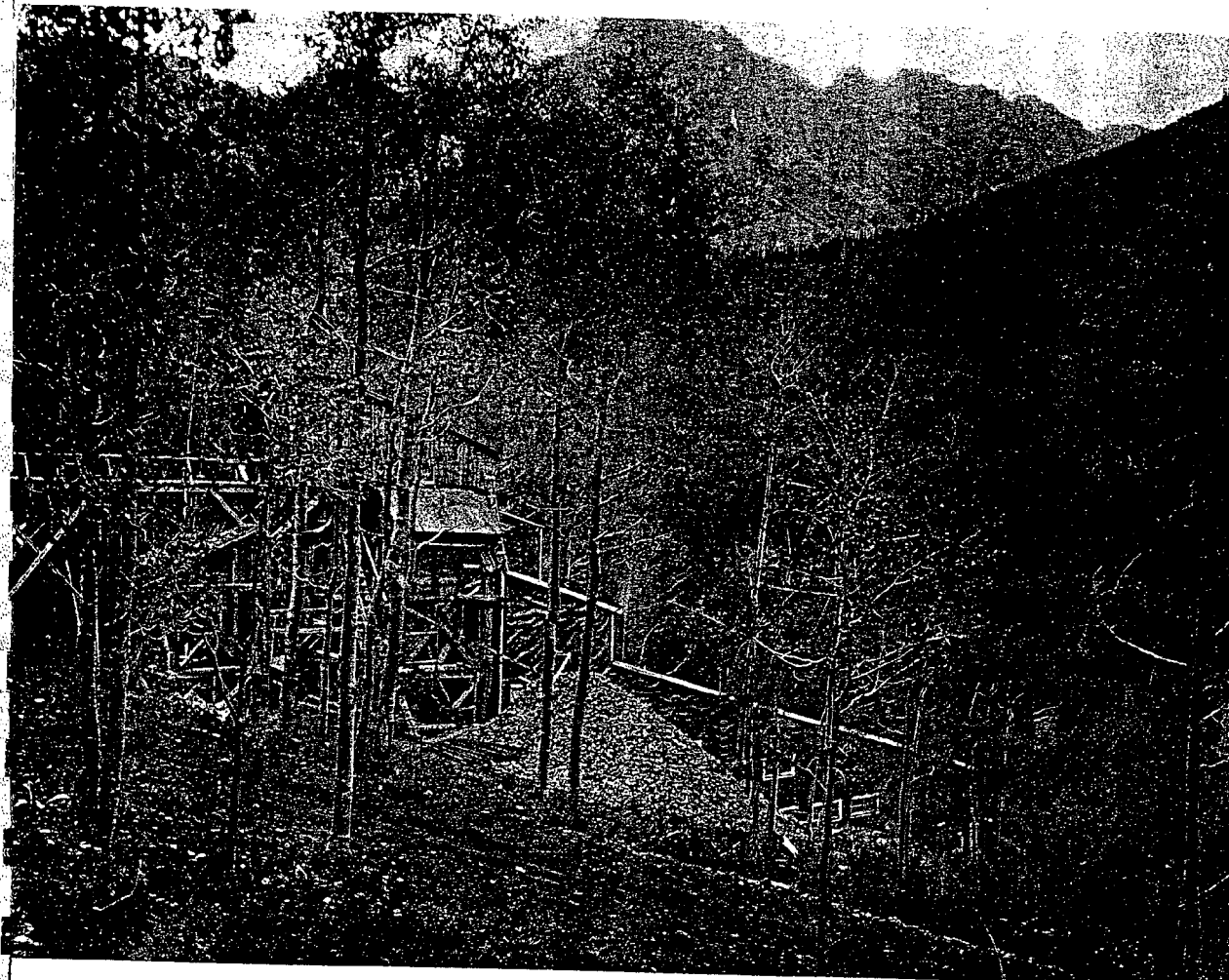


GRACE AND HAROLD BREWER COLLECTION

THIS AIR COMPRESSOR was on a sled in front of the general mercantile store at the Ophir station. It was probably brought-in by the Rio Grande Southern, and the sled appears to be headed up the Howard Fork Valley. None of the mines in the Howard Fork area were very active during the 1920's or 1930's, except the Carbonero Mine. The Carbonero interests upgraded their mine and built a mill to process their ore in 1924, so it seems likely that this compressor was going to the Carbonero Mine.

DELL A. MCCOY PHOTO

OVERLEAF: This panoramic scene shows off the Howard Fork Valley. The photographer was about one and a half miles from Ophir, which appears as a tiny cluster of buildings, near the center of this view. Three summits of Yellow Mountain are at the left, the Mount Wilson group of peaks is on the skyline to the left of center, the Ophir Loop was down at the foot of the jagged Ophir Needles, and Silver Mountain forms a long ridge on the right skyline. The Carbonero worked the area adjacent to the mine dumps at upper right.



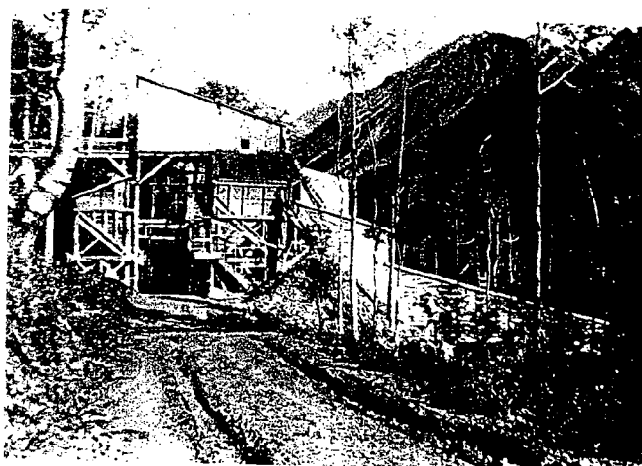
KATE MULVEY PHOTO — WILLIAM A. GRAVES COLLECTION

THIS PHOTOGRAPH of the Carbonero mill was taken in 1929 or 1930. Ore production was good for about five years during the late 1920's. However, about two-

thirds of the ore's value was in lead, and when lead prices dropped to less than four cents a pound during the Great Depression, the Carbonero closed down.

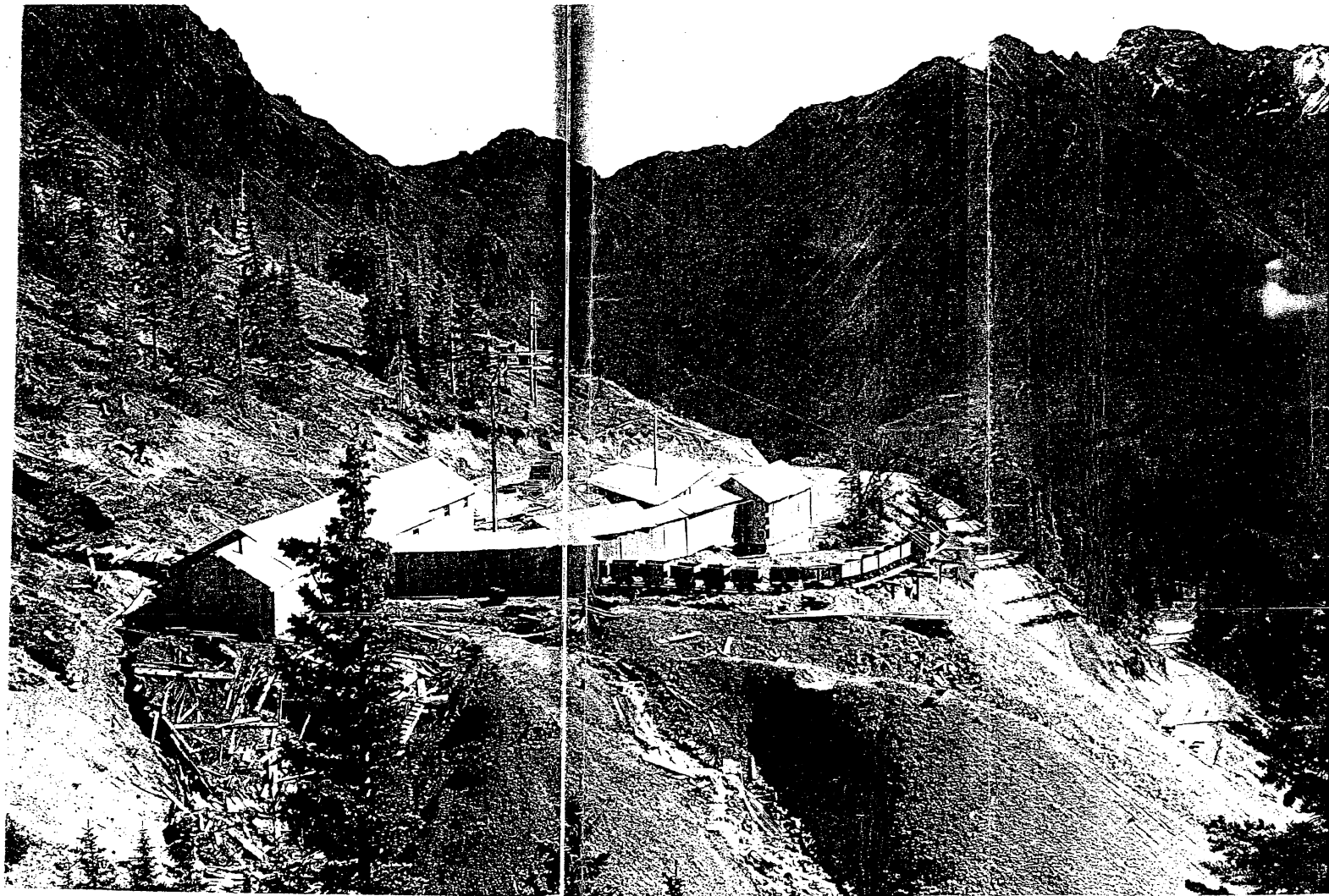
RUTH HOCKIN PHOTO

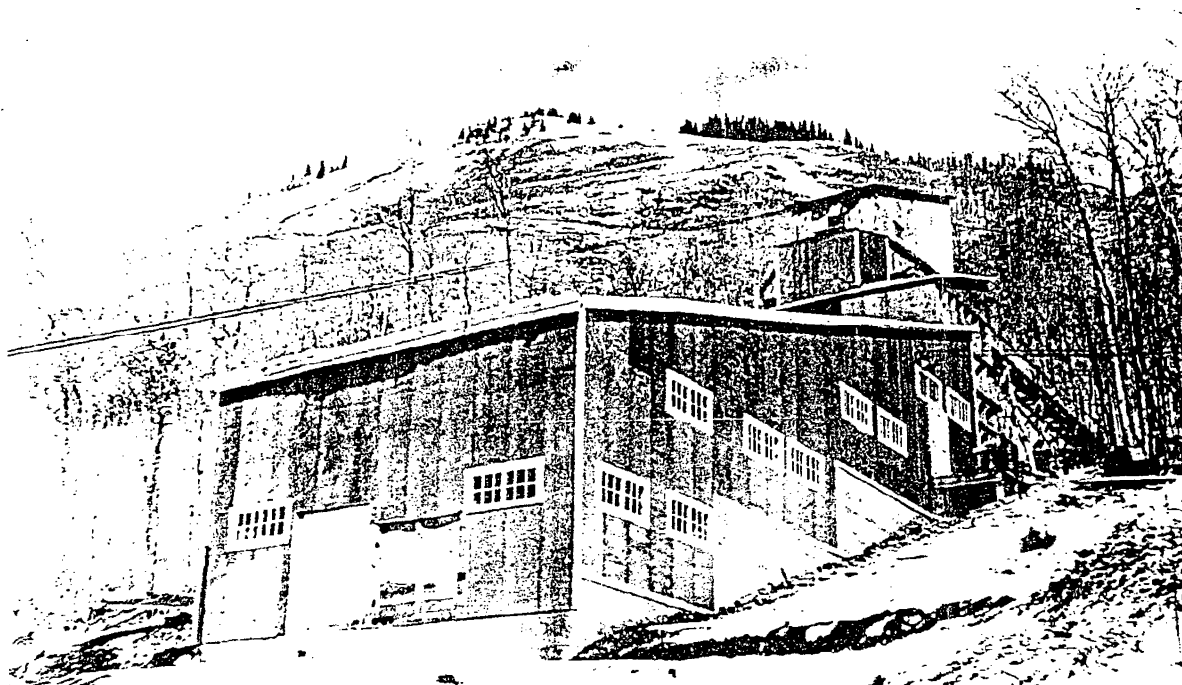
THE 1923 CARBONERO MILL was a type known as a Ruth-rod mill. This mill used the froth-flotation process, which was widely used at that time. It was served by an aerial tramway from the ore bins at the Shoofly Tunnel. The cable line was about 3,300 feet long.



MELVIN CARLSON PHOTO -
WILLIAM A. GRAVES COLLECTION

THIS BEAUTIFUL VIEW was taken in 1953. It shows the Carbonero's Shoofty tunnel portal, when the mine was still being worked by the Silver Bell Mining Company of Milwaukee, Wisconsin. According to reports submitted to the Bureau of Mines, the mine produced about \$150,000 worth of silver / lead ore annually for several years during this period of time (after World War II). The ore was trucked down a new road (seen at the lower right) to the Silver Bell mill at the Ophir Loop. However, the price of lead dropped, and the Carbonero closed down during late 1954.





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DURING ITS EARLY YEARS, the Carbonero Mine was greatly handicapped by not having a mill to process its ore. In 1923, the Carbonero was leased by the Tejon Investment Company of Colorado Springs. This firm built a new 50-ton-per-day mill, which is seen in this photograph when it was new.

two-bucket aerial tramway from the Shoolfly portal. The cableway was 3,300 feet long and had a 1,300-foot drop. The new operation was a success. Annual production doubled to \$160,676 in 1925 and climbed to \$187,708 in 1926. In spite of the success, Shoup lost interest in the Carbonero and went to Arizona to pursue other investments. Some people believe that Shoup was given bad advice by engineers at the Carbonero about the future prospects of the mine. Others believe that Shoup was discouraged by management problems and bad working conditions at the mine.

The Carbonero Mine was leased to Carlo Girardi and Martin Anderson. Girardi was from Telluride, and Anderson had been a mining inspector for the State of Colorado. For the three years of operation under Girardi and Anderson, production rose to over \$700,000. Two-thirds of the values were lead, and most of the remainder was silver. This production was the greatest in the Carbonero's history. About 30 to 40 men were employed at the mine at this time. Anderson withdrew from the partnership, and Girardi shut the mine down in 1931, when the price of

lead dropped to less than four cents a pound. At that time, Girardi had paid \$80,000 of a purchase price of \$100,000, but he could not continue payments, and the mine was returned to its owner, the Carbonero Mines & Reduction Company.

No production was reported at the Carbonero for the next 10 years, except for very small amounts in 1934 and 1936. During 1936, the lessee was Matt Ruutilla, who had leased the mine in the early 1920's. Four or five miners, including Randy Belisle, produced several carloads of lead-silver ore. Randy remembers that "Peanuts" became a problem. Ruutilla rented a burro by the month and stabled him near the mine portal. The burro's name was "Peanuts." When Ruutilla prepared monthly business-expense statements, instead of listing a burro rental for the month, he just listed "Peanuts." One of Matt's associates, after noting this item for several months, said, "Matt, how in h— can four or five guys eat \$15 worth of peanuts every month?!" Another lessee, Western Mines, Inc., leased the Carbonero in 1942, but they did not work it.

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WILLIAM A. GRAVES PHOTO

AN OLD FOOT TRAIL on Silver Mountain led to the Shoofly Tunnel of the Carbonero Mine. The tunnel portal was caved-in, and the buildings that were constructed in 1950 were also demolished.

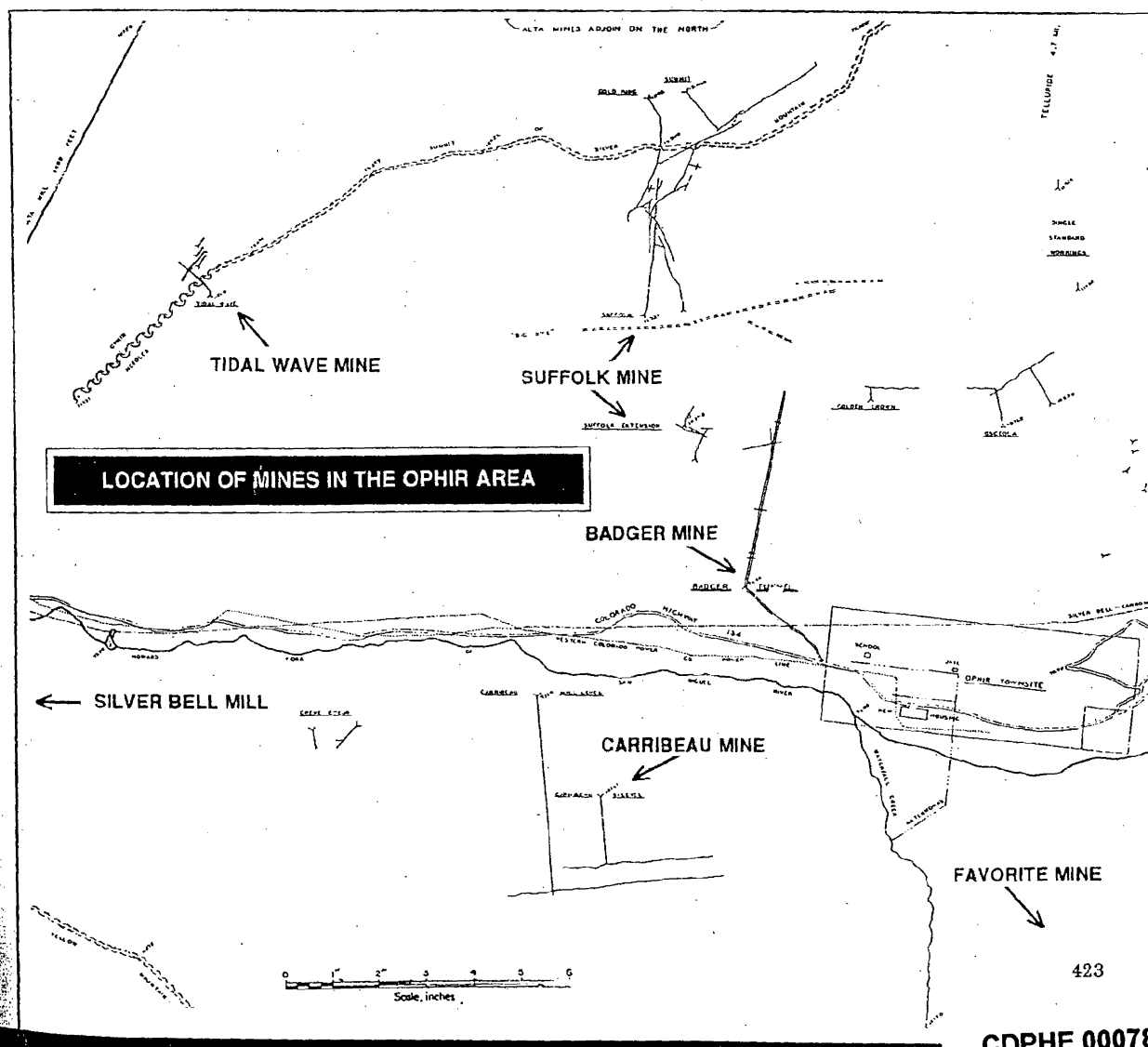
The last on-and-off cycle at the Carbonero began in 1951, when the Silver Bell Mining Company of Milwaukee, Wisconsin, purchased the mine from the old Carbonero Mines & Reduction Company. The Silver Bell firm demolished the old mill and aerial tramway, and burned the old buildings at the mine. At a cost of \$11,000, they built a new road to the Shoofly portal. This rocky road was about two miles long, and it had to utilize switchbacks to reach the mine. Ore was hauled down the road in a four-wheel-drive truck to the Silver Bell mill, near Ophir station. (See "The Silver Bell Mine" later in this chapter.) A large ore bin and other buildings were constructed

at the Shoofly, at an elevation of 11,480 feet. The portal was re-timbered for a distance of 400 feet. At the same time, a mine locomotive and 20 ore cars were purchased, and 12 men were

Over \$450,000 of lead-silver ore was produced in three years, three-fourths of which was lead. During these three years, the price of lead dropped from 17 to 13 cents a pound, and the Silver Bell stopped all operations at the Carbonero in 1954.

All the buildings have since been demolished at the Shoofly portal, and the portal has caved-in. The property has been owned since 1980 by a Colorado investor.

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